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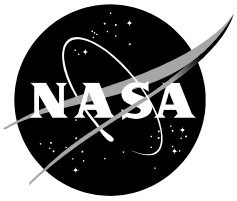

Mars Science Helicopter Rotor Geometry

Witold J. F. Koning
Science and Technology Corporation, Moffett Field, California

Michelle Dominguez, Wayne Johnson
Ames Research Center, Moffett Field, California

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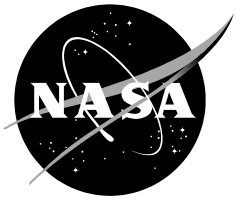

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National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, California 94035-1000

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NOMENCLATURE

A	=	rotor disk area, m^2
c	=	chord, m
M	=	blade section Mach number
r	=	rotor radial coordinate, m
R	=	rotor radius, m
Re	=	chord-based Reynolds number, $\rho Vc/\mu$
RPM	=	revolutions per minute
t	=	airfoil thickness, m
V	=	section resultant velocity, m/s
V_{tip}	=	tip speed of blade
α	=	angle of attack, deg
φ	=	blade twist, deg
λ	=	taper ratio
σ	=	solidity (thrust-weighted)

Subscripts

tip	=	tip-based
root	=	root-based
OML	=	obtained from OML geometry

Abbreviations

CAD	Computer Aided Design
DEP	Double-Edged Plate
JPL	NASA Jet Propulsion Laboratory
MSH	Mars Science Helicopter
OML	Outer Mold Line
UNS	Unsteady Navier-Stokes

ABSTRACT

The Jet Propulsion Laboratory and NASA Ames Research Center are exploring possibilities for a Mars Science Helicopter (MSH), a second-generation Mars rotorcraft designed to conduct science investigations independently of a lander or rover. The goal of the MSH concept design is to establish the feasibility of flying a larger, more capable rotorcraft on Mars, with a payload of two to three kg and an overall vehicle mass of approximately twenty kg. This report documents the geometry, including planform, twist, and airfoils, of the hexacopter configuration MSH rotor for use in future research on rotor performance in the Mars atmosphere.

INTRODUCTION

The Jet Propulsion Laboratory (JPL) and NASA Ames Research Center are exploring possibilities for a Mars Science Helicopter, a second-generation Mars rotorcraft capable of conducting science investigations independently of a lander or rover [1].

The design process began with coaxial-helicopter and hexacopter configurations, with a payload in the range of two to three kg and an overall vehicle mass of approximately twenty kg. Initial estimates of weight and performance were based on the capabilities of the Mars Helicopter Ingenuity [2] . Rotorcraft designs for Mars are constrained by the dimensions of the aeroshell and lander for the trip to the planet, requiring attention to the aircraft packaging to maximize the rotor dimensions and overall performance potential.

Aerodynamic performance optimization was conducted, focusing on airfoils designed specifically for the low Reynolds number and high Mach number inherent to operation on Mars [3]. Rotor structural designs were developed that met blade frequency and weight targets, subject to material stress limits. The final designs show a substantial capability for science operations on Mars: a 31-kg hexacopter, shown in Figure 1, that fits within a 2.5 m diameter aeroshell could carry a 5-kg payload for 10 min of hover time or over a range of 5 km. A couple configurations were studied for this effort; however, from this point forward, references to ‘MSH’ will refer to the hexacopter configuration.

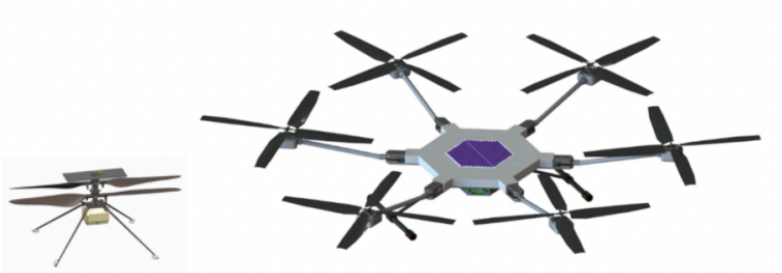

Figure 1. MSH hexacopter configuration with Mars Helicopter Ingenuity (left) for scale [1].

Flight in the Mars atmosphere presents various difficulties because of the thin atmosphere (approximately 1% of the density of that of Earth) and the low temperature (reducing the speed of sound, increasing Mach number). The low density of the Martian atmosphere and the relatively small-scale rotor result in flows with very low Reynolds number, reducing the lifting force and lifting efficiency, respectively. The MSH rotor design features six four-bladed rotors. The rotors

have a baseline 0.193 solidity and are designed to operate at speeds of 2,435 RPM, or a tip speed in the Mars atmosphere of around V_{tip} = 163 m/s. This results in a tip Mach number of roughly 0.70 and a Reynolds number of approximately 26,740 (for a 0.10 m chord).

The purpose of this report is to document the geometry (planform, twist, and airfoils) of the Mars Science Helicopter (MSH) rotor for use in future research on rotor performance in the Martian atmosphere.

BACKGROUND

For an overview of early work on Mars aerial exploration, readers are referred to the MSH conceptual design report, Ref. [1]. This chapter will discuss the background of the MSH rotor design and optimization efforts.

Following the success of Ingenuity, efforts were made to explore ways to improve rotor performance and efficiency. The low Mars atmospheric density inherently limits thrust; the results of Ref [4] showed potential to improve efficiency, but efficient airfoil and rotor shapes for this aerodynamic regime were not thoroughly studied. An early study focused on replacing the Ingenuity rotor airfoils with flat and cambered plate airfoils to identify possible improvements in rotor performance [5]. The resulting increases in predicted performance, achieved without any dedicated airfoil or rotor optimization, led to an effort to identify types of unconventional airfoils and hypothesized potential benefits at these conditions [6]. Subsequent efforts included dedicated airfoil optimization efforts [7], and the optimization of the MSH airfoils [3] as used in the MSH rotor designs (see Figure 2). Double-Edged Plate (DEP) airfoils optimized for each Re/M ratio along the span were selected from the Pareto fronts (see Ref. [3]) to populate the rotor blades, with a linear twist rate applied to the blade.

Additionally, studies were conducted using alternative outboard airfoils, such as the clf5605 [8, 2] and cambered plate airfoils; however, only the DEP airfoils' geometry will be presented in this report (no CAD models have been built for these designs, nor for the MSH coaxial configuration). The thin airfoils warrant a thorough study into blade structure and dynamics, and these are analyzed in Ref. [9] for the MSH hexacopter and further elaborated upon in Ref. [1].

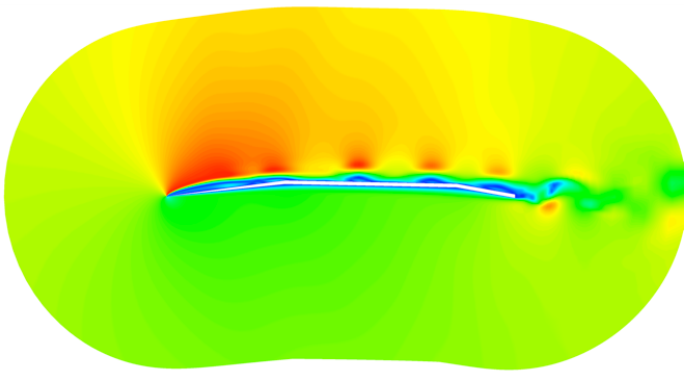

Figure 2. DEP airfoil velocity magnitude at α = 4.0°, M = 0.52, and Re = 16,862 (from Ref. [3]).

At the time of this report, the methodology has evolved to allow for coupled airfoil and rotor optimization using the Evolutionary Algorithm for Iterative Studies of Aeromechanics (ELISA)

[10], which was developed as part of the Rotor Optimization for the Advancement of Mars eXploration (ROAMX) project [11]. ELISA integrates manufacturing constraints, standardized ROAMX airfoil parameterization for unconventional airfoils (with DEP airfoils now parameterized as roamx-2101 airfoils), and higher dimensional Pareto-optimal sets.

For flows in the compressible low Reynolds number regime found on the MSH rotors, the hypothesis is that while turbulence exists (i.e., smaller scales), it does not contribute meaningfully to the mean forces on the airfoils. This was substantiated by previous work showing satisfactory correlation up to relatively high Reynolds numbers (Re < 300,000) for the Eppler 387 airfoil performance solving laminar unsteady Navier-Stokes (UNS) equations at low Reynolds numbers (60,000 ≤ Re ≤ 460,000) to experimental data [12]. The study showed that the mean behavior of unsteady Laminar Separation Bubbles (LSB) can be captured accurately using laminar UNS. Transition was governed by a separated shear layer instability resulting in the shedding of large-scale coherent vortices, resulting in reattachment of the mean flow only [10, 12].

ROTOR GEOMETRY

The rotor performance in hover and forward flight were calculated using CAMRAD II [13], using the airfoil table for a circular arc section (5% camber, 1% thickness). Planform taper and blade twist were varied to minimize the rotor power required at the design conditions, keeping the blade thrust-weighted solidity constant. Reduced chord was considered for the root (negative taper, to 0.25R) to reduce weight, since the inboard chord is not very important for performance. Additional taper was considered at the tip (outboard of 0.75R). The optimum linear taper was c_{tip}/c_{root} = 0.85, with more taper at the tip (0.43) and reduced chord at the root. A large negative twist is good for hover and low speed rotor performance. Twist values from –12 to –24 deg (linear, root to tip) were considered, including different inboard and outboard twists. The optimum linear twist was found to be –18 deg.

Table 1 provides key rotor parameters and Table 2 includes the basic rotor geometry information from which the rotor twist, planform, and airfoil locations can be obtained. No sweep is applied at any radial station. Table 2 also contains the blade twist and chord distributions as extracted from the original outer mold line (OML) Computer Aided Design (CAD) model of the MSH hexacopter, at selected radial stations. Figure 3 shows the chord, thickness, and twist distributions versus radius. Figure 4 shows the optimized aerodynamic shape for the MSH hexacopter blade, with radius of R = 0.64 m and solidity = 0.142.

Table 1. Key MSH hexacopter rotor parameters

Parameter	Value
Rotor radius, R	0.640 m
Number rotors	6
Number blades	4
Disk area, A	7.72 m^2
Solidity (thrust-weighted), σ	0.142
Tip speed, RPM	2,782

Table 2. MSH hexacopter configuration design rotor twist, planform, and airfoil locations

r/R	c/R	φ (deg)	φ_{OML} (deg)	r (m)	c (m)	c_{OML} (m)	t/c	airfoil[1]
0.036*			11.00			0.0160		(circular)
0.060*			11.00			0.0160		(circular)
0.090	0.0945	11.88	11.88	0.0576	0.0605	0.0605	0.080	Station 1
0.250	0.1298	9.00	9.00	0.1600	0.0831	0.0831	0.080	Station 2
0.500	0.1248	4.50	4.50	0.3200	0.0799	0.0799	0.010	Station 3
0.750	0.1197	0.00	0.00	0.4800	0.0766	0.0766	0.010	Station 4-5
1.000	0.0906	-4.50	4.50	0.6400	0.0580	0.0580	0.010	Station 4-5

**Only applicable to CAD model/OML.*

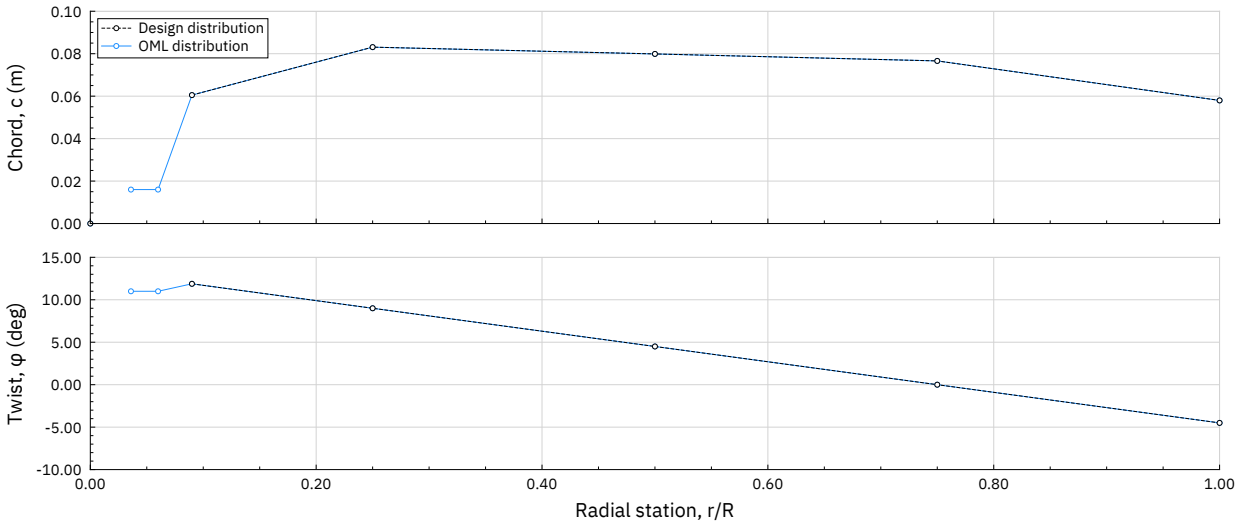

Figure 3. Design and OML rotor chord and twist distributions (from Table 2).

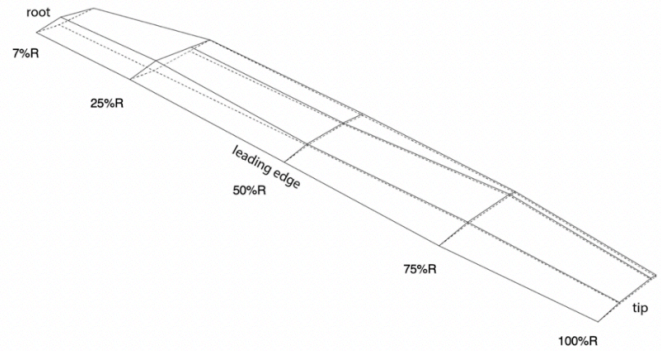

Figure 4. Optimized rotor blade for Mars Helicopter.

[1] See Figure 5.

AIRFOIL GEOMETRY

Airfoils were optimized and designed [3] for sections at r/R = 0.07 (root), 0.25, 0.50, 0.75, and 1.00 (tip). For the inboard two sections the minimum thickness ratio was constrained to 8%, to reflect the structural requirements of the blade design. The outboard Double-Edged Plate (DEP) (or roamx-2101 [10]) airfoils are thin airfoils developed for the low Reynolds number experienced by the rotor in the Mars atmosphere. The outboard airfoils for each Re/M ratio along the span were selected from the Pareto front. Experimental work (Ref. [14]) has demonstrated thin airfoils as giving good performance at compressible low Reynolds numbers. The four airfoils used on the rotor (see Table 2) are shown in Figure 5. The original normalized airfoil coordinates for each airfoil are presented in Appendix A and are used for the performance predictions in Ref. [1].

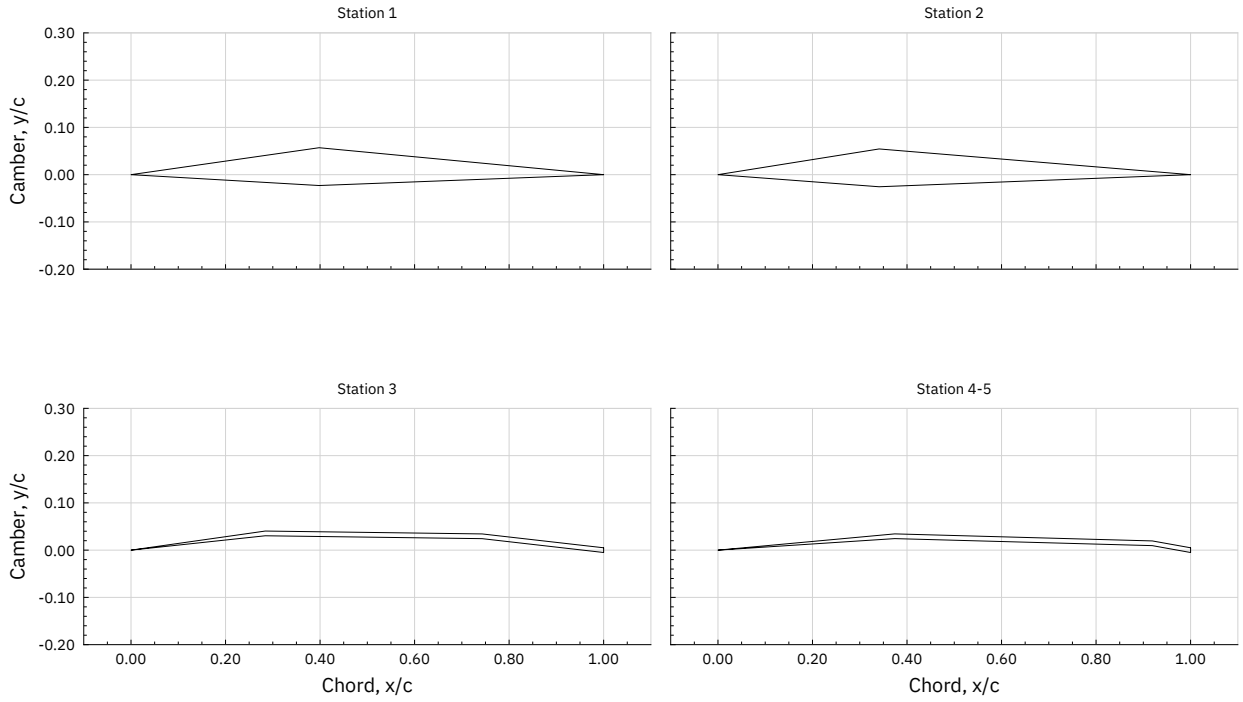

Figure 5. Normalized design airfoil profiles for Stations 1 through 4-5.

The OML CAD model of the MSH rotor blade was utilized to extract the 'as-built' airfoil geometries for representative radial stations (as shown in Table 2 and Figure 6). Each airfoil profile consists of around 1,000 coordinates, split into an upper and lower surface with a shared coordinate on the leading-edge point. The airfoils are unpitched and normalized by chord to facilitate further analyses. The normalized airfoil coordinates for each airfoil are presented in Appendix B. The primary difference in the geometries originates from the thin leading edges in the design airfoil profiles, as at the time of the airfoil optimization [3] the manufacturing constraints on thickness were not quantified yet, in contrast to later work [10].

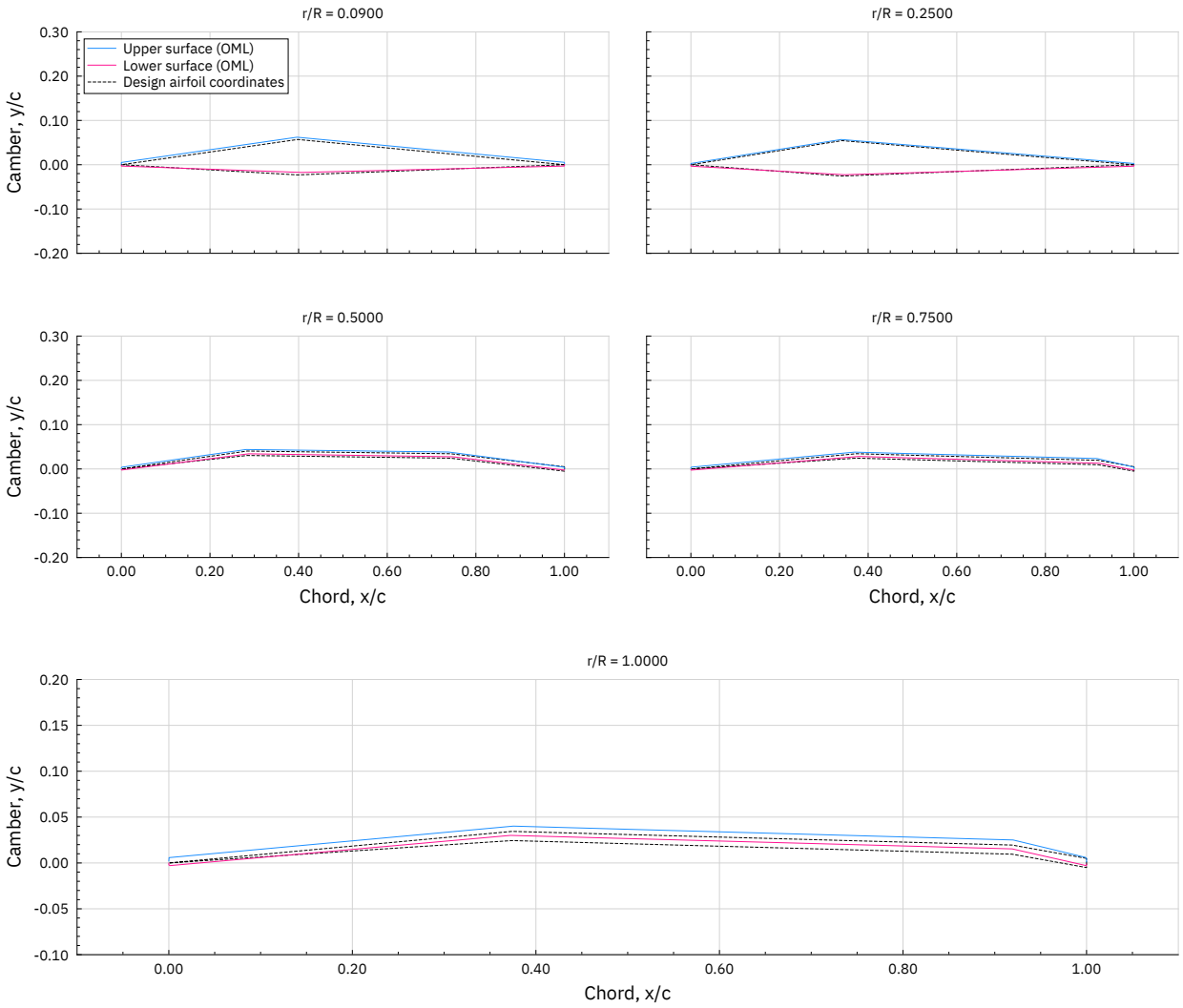

Figure 6. Normalized OML airfoil profiles for 5 representative radial stations.

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APPENDIX A

The design normalized airfoil coordinates for Stations 1 through 4-5 are presented in Table 3 through Table 6, respectively. Note that these profiles have an infinitely sharp leading edge; Appendix B presents the normalized OML ('as-built') profiles.

Table 3. Design station 1 airfoil coordinates

x/c	y/c
1.0000	0.0000
0.3984	0.0570
0.0000	0.0000
0.3984	-0.0230
1.0000	0.0000

Table 4. Design station 2 airfoil coordinates

x/c	y/c
1.0000	0.0000
0.3411	0.0544
0.0000	0.0000
0.3411	-0.0256
1.0000	0.0000

Table 5. Design station 3 airfoil coordinates

x/c	y/c
1.0000	0.0050
0.7428	0.0343
0.2838	0.0404
0.0000	0.0000
0.2838	0.0304
0.7428	0.0243
1.0000	-0.0050
1.0000	0.0050

Table 6. Design station 4-5 airfoil coordinates

x/c	y/c
1.0000	0.0050
0.9189	0.0195
0.3738	0.0344
0.0000	0.0000
0.3738	0.0244
0.9189	0.0095
1.0000	-0.0050
1.0000	0.0050

APPENDIX B

The OML ('as-built') normalized airfoil coordinates for various radial stations are plotted in Table 7 through Table 16. Both upper and lower surface coordinates are presented separately, with a coincident point at the leading edge. Around 1,000 coordinates are distributed along the profile for each airfoil.

Table 7. OML Station 1 upper surface airfoil coordinates, r/R = 0.090

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
1.00000	0.00244	0.92835	0.01214	0.85380	0.01920	0.77924	0.02626
1.00000	0.00447	0.92634	0.01233	0.85178	0.01939	0.77723	0.02645
0.99887	0.00547	0.92432	0.01253	0.84977	0.01958	0.77521	0.02664
0.99686	0.00566	0.92231	0.01272	0.84775	0.01978	0.77320	0.02683
0.99484	0.00585	0.92029	0.01291	0.84574	0.01997	0.77118	0.02703
0.99283	0.00604	0.91828	0.01310	0.84372	0.02016	0.76917	0.02722
0.99081	0.00623	0.91626	0.01329	0.84171	0.02035	0.76715	0.02741
0.98880	0.00642	0.91425	0.01348	0.83969	0.02054	0.76514	0.02760
0.98678	0.00661	0.91223	0.01367	0.83768	0.02073	0.76312	0.02779
0.98477	0.00680	0.91022	0.01386	0.83566	0.02092	0.76111	0.02798
0.98275	0.00699	0.90820	0.01405	0.83365	0.02111	0.75909	0.02817
0.98074	0.00718	0.90619	0.01424	0.83163	0.02130	0.75708	0.02836
0.97872	0.00737	0.90417	0.01443	0.82962	0.02149	0.75506	0.02855
0.97671	0.00756	0.90216	0.01462	0.82760	0.02168	0.75305	0.02874
0.97470	0.00776	0.90014	0.01481	0.82559	0.02187	0.75103	0.02893
0.97268	0.00795	0.89813	0.01501	0.82357	0.02206	0.74902	0.02912
0.97067	0.00814	0.89611	0.01520	0.82156	0.02226	0.74700	0.02931
0.96865	0.00833	0.89410	0.01539	0.81954	0.02245	0.74499	0.02951
0.96664	0.00852	0.89208	0.01558	0.81753	0.02264	0.74297	0.02970
0.96462	0.00871	0.89007	0.01577	0.81551	0.02283	0.74096	0.02989
0.96261	0.00890	0.88805	0.01596	0.81350	0.02302	0.73894	0.03008
0.96059	0.00909	0.88604	0.01615	0.81148	0.02321	0.73693	0.03027
0.95858	0.00928	0.88402	0.01634	0.80947	0.02340	0.73491	0.03046
0.95656	0.00947	0.88201	0.01653	0.80745	0.02359	0.73290	0.03065
0.95455	0.00966	0.87999	0.01672	0.80544	0.02378	0.73088	0.03084
0.95253	0.00985	0.87798	0.01691	0.80342	0.02397	0.72887	0.03103
0.95052	0.01005	0.87596	0.01710	0.80141	0.02416	0.72685	0.03122
0.94850	0.01024	0.87395	0.01729	0.79939	0.02435	0.72484	0.03141
0.94649	0.01043	0.87193	0.01749	0.79738	0.02454	0.72282	0.03160
0.94447	0.01062	0.86992	0.01768	0.79536	0.02474	0.72081	0.03179
0.94246	0.01081	0.86790	0.01787	0.79335	0.02493	0.71879	0.03199
0.94044	0.01100	0.86589	0.01806	0.79133	0.02512	0.71678	0.03218
0.93843	0.01119	0.86387	0.01825	0.78932	0.02531	0.71476	0.03237
0.93641	0.01138	0.86186	0.01844	0.78730	0.02550	0.71275	0.03256
0.93440	0.01157	0.85984	0.01863	0.78529	0.02569	0.71073	0.03275
0.93238	0.01176	0.85783	0.01882	0.78327	0.02588	0.70872	0.03294
0.93037	0.01195	0.85581	0.01901	0.78126	0.02607	0.70670	0.03313

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.70469	0.03332	0.62610	0.04076	0.54752	0.04820	0.46894	0.05564
0.70267	0.03351	0.62409	0.04095	0.54550	0.04839	0.46692	0.05583
0.70066	0.03370	0.62207	0.04114	0.54349	0.04858	0.46491	0.05602
0.69864	0.03389	0.62006	0.04133	0.54147	0.04877	0.46289	0.05622
0.69663	0.03408	0.61804	0.04152	0.53946	0.04897	0.46088	0.05641
0.69461	0.03427	0.61603	0.04172	0.53744	0.04916	0.45886	0.05660
0.69260	0.03447	0.61401	0.04191	0.53543	0.04935	0.45685	0.05679
0.69058	0.03466	0.61200	0.04210	0.53341	0.04954	0.45483	0.05698
0.68857	0.03485	0.60998	0.04229	0.53140	0.04973	0.45282	0.05717
0.68655	0.03504	0.60797	0.04248	0.52939	0.04992	0.45080	0.05736
0.68454	0.03523	0.60595	0.04267	0.52737	0.05011	0.44879	0.05755
0.68252	0.03542	0.60394	0.04286	0.52536	0.05030	0.44677	0.05774
0.68051	0.03561	0.60192	0.04305	0.52334	0.05049	0.44476	0.05793
0.67849	0.03580	0.59991	0.04324	0.52133	0.05068	0.44274	0.05812
0.67648	0.03599	0.59789	0.04343	0.51931	0.05087	0.44073	0.05831
0.67446	0.03618	0.59588	0.04362	0.51730	0.05106	0.43871	0.05850
0.67245	0.03637	0.59386	0.04381	0.51528	0.05125	0.43670	0.05870
0.67043	0.03656	0.59185	0.04401	0.51327	0.05145	0.43468	0.05889
0.66842	0.03676	0.58983	0.04420	0.51125	0.05164	0.43267	0.05908
0.66640	0.03695	0.58782	0.04439	0.50924	0.05183	0.43065	0.05927
0.66439	0.03714	0.58580	0.04458	0.50722	0.05202	0.42864	0.05946
0.66237	0.03733	0.58379	0.04477	0.50521	0.05221	0.42662	0.05965
0.66036	0.03752	0.58177	0.04496	0.50319	0.05240	0.42461	0.05984
0.65834	0.03771	0.57976	0.04515	0.50118	0.05259	0.42259	0.06003
0.65633	0.03790	0.57774	0.04534	0.49916	0.05278	0.42058	0.06022
0.65431	0.03809	0.57573	0.04553	0.49715	0.05297	0.41856	0.06041
0.65230	0.03828	0.57371	0.04572	0.49513	0.05316	0.41655	0.06060
0.65028	0.03847	0.57170	0.04591	0.49312	0.05335	0.41453	0.06079
0.64827	0.03866	0.56968	0.04610	0.49110	0.05354	0.41252	0.06099
0.64625	0.03885	0.56767	0.04629	0.48909	0.05374	0.41050	0.06118
0.64424	0.03904	0.56565	0.04649	0.48707	0.05393	0.40849	0.06137
0.64222	0.03924	0.56364	0.04668	0.48506	0.05412	0.40647	0.06156
0.64021	0.03943	0.56162	0.04687	0.48304	0.05431	0.40446	0.06175
0.63819	0.03962	0.55961	0.04706	0.48103	0.05450	0.40244	0.06194
0.63618	0.03981	0.55759	0.04725	0.47901	0.05469	0.40043	0.06213
0.63416	0.04000	0.55558	0.04744	0.47700	0.05488	0.39841	0.06232
0.63215	0.04019	0.55356	0.04763	0.47498	0.05507	0.39641	0.06213
0.63013	0.04038	0.55155	0.04782	0.47297	0.05526	0.39440	0.06184
0.62812	0.04057	0.54953	0.04801	0.47095	0.05545	0.39240	0.06156

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.39039	0.06127	0.31226	0.05008	0.23412	0.03889	0.15598	0.02770
0.38839	0.06098	0.31025	0.04979	0.23211	0.03860	0.15398	0.02741
0.38639	0.06070	0.30825	0.04951	0.23011	0.03832	0.15197	0.02712
0.38438	0.06041	0.30625	0.04922	0.22811	0.03803	0.14997	0.02684
0.38238	0.06012	0.30424	0.04893	0.22610	0.03774	0.14797	0.02655
0.38038	0.05984	0.30224	0.04865	0.22410	0.03745	0.14596	0.02626
0.37837	0.05955	0.30024	0.04836	0.22210	0.03717	0.14396	0.02598
0.37637	0.05926	0.29823	0.04807	0.22009	0.03688	0.14196	0.02569
0.37437	0.05897	0.29623	0.04778	0.21809	0.03659	0.13995	0.02540
0.37236	0.05869	0.29422	0.04750	0.21609	0.03631	0.13795	0.02512
0.37036	0.05840	0.29222	0.04721	0.21408	0.03602	0.13594	0.02483
0.36836	0.05811	0.29022	0.04692	0.21208	0.03573	0.13394	0.02454
0.36635	0.05783	0.28821	0.04664	0.21008	0.03545	0.13194	0.02426
0.36435	0.05754	0.28621	0.04635	0.20807	0.03516	0.12993	0.02397
0.36235	0.05725	0.28421	0.04606	0.20607	0.03487	0.12793	0.02368
0.36034	0.05697	0.28220	0.04578	0.20407	0.03459	0.12593	0.02339
0.35834	0.05668	0.28020	0.04549	0.20206	0.03430	0.12392	0.02311
0.35633	0.05639	0.27820	0.04520	0.20006	0.03401	0.12192	0.02282
0.35433	0.05611	0.27619	0.04491	0.19805	0.03372	0.11992	0.02253
0.35233	0.05582	0.27419	0.04463	0.19605	0.03344	0.11791	0.02225
0.35032	0.05553	0.27219	0.04434	0.19405	0.03315	0.11591	0.02196
0.34832	0.05524	0.27018	0.04405	0.19204	0.03286	0.11391	0.02167
0.34632	0.05496	0.26818	0.04377	0.19004	0.03258	0.11190	0.02139
0.34431	0.05467	0.26618	0.04348	0.18804	0.03229	0.10990	0.02110
0.34231	0.05438	0.26417	0.04319	0.18603	0.03200	0.10789	0.02081
0.34031	0.05410	0.26217	0.04291	0.18403	0.03172	0.10589	0.02052
0.33830	0.05381	0.26016	0.04262	0.18203	0.03143	0.10389	0.02024
0.33630	0.05352	0.25816	0.04233	0.18002	0.03114	0.10188	0.01995
0.33430	0.05324	0.25616	0.04205	0.17802	0.03085	0.09988	0.01966
0.33229	0.05295	0.25415	0.04176	0.17602	0.03057	0.09788	0.01938
0.33029	0.05266	0.25215	0.04147	0.17401	0.03028	0.09587	0.01909
0.32829	0.05238	0.25015	0.04118	0.17201	0.02999	0.09387	0.01880
0.32628	0.05209	0.24814	0.04090	0.17000	0.02971	0.09187	0.01852
0.32428	0.05180	0.24614	0.04061	0.16800	0.02942	0.08986	0.01823
0.32227	0.05151	0.24414	0.04032	0.16600	0.02913	0.08786	0.01794
0.32027	0.05123	0.24213	0.04004	0.16399	0.02885	0.08586	0.01766
0.31827	0.05094	0.24013	0.03975	0.16199	0.02856	0.08385	0.01737
0.31626	0.05065	0.23813	0.03946	0.15999	0.02827	0.08185	0.01708
0.31426	0.05037	0.23612	0.03918	0.15798	0.02799	0.07985	0.01679

x/c	y/c
0.07784	0.01651
0.07584	0.01622
0.07383	0.01593
0.07183	0.01565
0.06983	0.01536
0.06782	0.01507
0.06582	0.01479
0.06382	0.01450
0.06181	0.01421
0.05981	0.01393
0.05781	0.01364

x/c	y/c
0.05580	0.01335
0.05380	0.01306
0.05180	0.01278
0.04979	0.01249
0.04779	0.01220
0.04578	0.01192
0.04378	0.01163
0.04178	0.01134
0.03977	0.01106
0.03777	0.01077
0.03577	0.01048

x/c	y/c
0.03376	0.01020
0.03176	0.00991
0.02976	0.00962
0.02775	0.00933
0.02575	0.00905
0.02375	0.00876
0.02174	0.00847
0.01974	0.00819
0.01774	0.00790
0.01573	0.00761
0.01373	0.00733

x/c	y/c
0.01172	0.00704
0.00972	0.00675
0.00772	0.00646
0.00571	0.00618
0.00371	0.00589
0.00171	0.00560
0.00000	0.00506
0.00000	0.00304
0.00000	0.00101

Table 8. OML Station 1 lower surface airfoil coordinates, r/R = 0.090

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.00000	-0.00101	0.07281	-0.00571	0.14765	-0.00845	0.22249	-0.01120
0.00000	-0.00304	0.07484	-0.00578	0.14967	-0.00853	0.22451	-0.01127
0.00202	-0.00311	0.07686	-0.00586	0.15170	-0.00860	0.22653	-0.01135
0.00405	-0.00318	0.07888	-0.00593	0.15372	-0.00868	0.22856	-0.01142
0.00607	-0.00326	0.08091	-0.00600	0.15574	-0.00875	0.23058	-0.01150
0.00809	-0.00333	0.08293	-0.00608	0.15777	-0.00883	0.23260	-0.01157
0.01011	-0.00341	0.08495	-0.00615	0.15979	-0.00890	0.23462	-0.01165
0.01214	-0.00348	0.08697	-0.00623	0.16181	-0.00897	0.23665	-0.01172
0.01416	-0.00356	0.08900	-0.00630	0.16383	-0.00905	0.23867	-0.01179
0.01618	-0.00363	0.09102	-0.00638	0.16586	-0.00912	0.24069	-0.01187
0.01820	-0.00370	0.09304	-0.00645	0.16788	-0.00920	0.24272	-0.01194
0.02023	-0.00378	0.09506	-0.00652	0.16990	-0.00927	0.24474	-0.01202
0.02225	-0.00385	0.09709	-0.00660	0.17192	-0.00934	0.24676	-0.01209
0.02427	-0.00393	0.09911	-0.00667	0.17395	-0.00942	0.24878	-0.01216
0.02629	-0.00400	0.10113	-0.00675	0.17597	-0.00949	0.25081	-0.01224
0.02832	-0.00408	0.10315	-0.00682	0.17799	-0.00957	0.25283	-0.01231
0.03034	-0.00415	0.10518	-0.00690	0.18001	-0.00964	0.25485	-0.01239
0.03236	-0.00422	0.10720	-0.00697	0.18204	-0.00972	0.25687	-0.01246
0.03438	-0.00430	0.10922	-0.00704	0.18406	-0.00979	0.25890	-0.01254
0.03641	-0.00437	0.11124	-0.00712	0.18608	-0.00986	0.26092	-0.01261
0.03843	-0.00445	0.11327	-0.00719	0.18810	-0.00994	0.26294	-0.01268
0.04045	-0.00452	0.11529	-0.00727	0.19013	-0.01001	0.26496	-0.01276
0.04248	-0.00459	0.11731	-0.00734	0.19215	-0.01009	0.26699	-0.01283
0.04450	-0.00467	0.11934	-0.00741	0.19417	-0.01016	0.26901	-0.01291
0.04652	-0.00474	0.12136	-0.00749	0.19619	-0.01024	0.27103	-0.01298
0.04854	-0.00482	0.12338	-0.00756	0.19822	-0.01031	0.27305	-0.01306
0.05057	-0.00489	0.12540	-0.00764	0.20024	-0.01038	0.27508	-0.01313
0.05259	-0.00497	0.12743	-0.00771	0.20226	-0.01046	0.27710	-0.01320
0.05461	-0.00504	0.12945	-0.00779	0.20429	-0.01053	0.27912	-0.01328
0.05663	-0.00511	0.13147	-0.00786	0.20631	-0.01061	0.28115	-0.01335
0.05866	-0.00519	0.13349	-0.00793	0.20833	-0.01068	0.28317	-0.01343
0.06068	-0.00526	0.13552	-0.00801	0.21035	-0.01075	0.28519	-0.01350
0.06270	-0.00534	0.13754	-0.00808	0.21238	-0.01083	0.28721	-0.01358
0.06472	-0.00541	0.13956	-0.00816	0.21440	-0.01090	0.28924	-0.01365
0.06675	-0.00549	0.14158	-0.00823	0.21642	-0.01098	0.29126	-0.01372
0.06877	-0.00556	0.14361	-0.00831	0.21844	-0.01105	0.29328	-0.01380
0.07079	-0.00563	0.14563	-0.00838	0.22047	-0.01113	0.29530	-0.01387

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.29733	-0.01395	0.37621	-0.01684	0.45511	-0.01625	0.53403	-0.01434
0.29935	-0.01402	0.37823	-0.01692	0.45714	-0.01621	0.53605	-0.01429
0.30137	-0.01409	0.38025	-0.01699	0.45916	-0.01616	0.53807	-0.01424
0.30339	-0.01417	0.38228	-0.01706	0.46118	-0.01611	0.54010	-0.01419
0.30542	-0.01424	0.38430	-0.01714	0.46321	-0.01606	0.54212	-0.01414
0.30744	-0.01432	0.38632	-0.01721	0.46523	-0.01601	0.54414	-0.01410
0.30946	-0.01439	0.38834	-0.01729	0.46725	-0.01596	0.54617	-0.01405
0.31148	-0.01447	0.39037	-0.01736	0.46928	-0.01591	0.54819	-0.01400
0.31351	-0.01454	0.39239	-0.01743	0.47130	-0.01586	0.55021	-0.01395
0.31553	-0.01461	0.39441	-0.01751	0.47332	-0.01581	0.55224	-0.01390
0.31755	-0.01469	0.39644	-0.01758	0.47535	-0.01576	0.55426	-0.01385
0.31958	-0.01476	0.39846	-0.01763	0.47737	-0.01571	0.55628	-0.01380
0.32160	-0.01484	0.40048	-0.01758	0.47939	-0.01567	0.55831	-0.01375
0.32362	-0.01491	0.40250	-0.01753	0.48142	-0.01562	0.56033	-0.01370
0.32564	-0.01499	0.40453	-0.01748	0.48344	-0.01557	0.56235	-0.01365
0.32767	-0.01506	0.40655	-0.01743	0.48546	-0.01552	0.56438	-0.01360
0.32969	-0.01513	0.40857	-0.01738	0.48749	-0.01547	0.56640	-0.01356
0.33171	-0.01521	0.41060	-0.01733	0.48951	-0.01542	0.56842	-0.01351
0.33373	-0.01528	0.41262	-0.01729	0.49153	-0.01537	0.57045	-0.01346
0.33576	-0.01536	0.41465	-0.01724	0.49356	-0.01532	0.57247	-0.01341
0.33778	-0.01543	0.41667	-0.01719	0.49558	-0.01527	0.57449	-0.01336
0.33980	-0.01550	0.41869	-0.01714	0.49760	-0.01522	0.57652	-0.01331
0.34182	-0.01558	0.42072	-0.01709	0.49963	-0.01517	0.57854	-0.01326
0.34385	-0.01565	0.42274	-0.01704	0.50165	-0.01513	0.58056	-0.01321
0.34587	-0.01573	0.42476	-0.01699	0.50367	-0.01508	0.58259	-0.01316
0.34789	-0.01580	0.42679	-0.01694	0.50570	-0.01503	0.58461	-0.01311
0.34991	-0.01588	0.42881	-0.01689	0.50772	-0.01498	0.58663	-0.01306
0.35194	-0.01595	0.43083	-0.01684	0.50974	-0.01493	0.58866	-0.01302
0.35396	-0.01602	0.43286	-0.01679	0.51177	-0.01488	0.59068	-0.01297
0.35598	-0.01610	0.43488	-0.01675	0.51379	-0.01483	0.59270	-0.01292
0.35801	-0.01617	0.43690	-0.01670	0.51581	-0.01478	0.59473	-0.01287
0.36003	-0.01625	0.43893	-0.01665	0.51784	-0.01473	0.59675	-0.01282
0.36205	-0.01632	0.44095	-0.01660	0.51986	-0.01468	0.59877	-0.01277
0.36407	-0.01640	0.44297	-0.01655	0.52189	-0.01463	0.60080	-0.01272
0.36610	-0.01647	0.44500	-0.01650	0.52391	-0.01459	0.60282	-0.01267
0.36812	-0.01654	0.44702	-0.01645	0.52593	-0.01454	0.60484	-0.01262
0.37014	-0.01662	0.44904	-0.01640	0.52796	-0.01449	0.60687	-0.01257
0.37216	-0.01669	0.45107	-0.01635	0.52998	-0.01444	0.60889	-0.01252
0.37419	-0.01677	0.45309	-0.01630	0.53200	-0.01439	0.61091	-0.01248

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.61294	-0.01243	0.69185	-0.01051	0.77076	-0.00860	0.84967	-0.00668
0.61496	-0.01238	0.69387	-0.01046	0.77279	-0.00855	0.85170	-0.00663
0.61698	-0.01233	0.69590	-0.01041	0.77481	-0.00850	0.85372	-0.00658
0.61901	-0.01228	0.69792	-0.01036	0.77683	-0.00845	0.85575	-0.00654
0.62103	-0.01223	0.69994	-0.01032	0.77886	-0.00840	0.85777	-0.00649
0.62305	-0.01218	0.70197	-0.01027	0.78088	-0.00835	0.85979	-0.00644
0.62508	-0.01213	0.70399	-0.01022	0.78290	-0.00830	0.86182	-0.00639
0.62710	-0.01208	0.70601	-0.01017	0.78493	-0.00825	0.86384	-0.00634
0.62912	-0.01203	0.70804	-0.01012	0.78695	-0.00820	0.86586	-0.00629
0.63115	-0.01198	0.71006	-0.01007	0.78897	-0.00816	0.86789	-0.00624
0.63317	-0.01194	0.71208	-0.01002	0.79100	-0.00811	0.86991	-0.00619
0.63520	-0.01189	0.71411	-0.00997	0.79302	-0.00806	0.87193	-0.00614
0.63722	-0.01184	0.71613	-0.00992	0.79504	-0.00801	0.87396	-0.00609
0.63924	-0.01179	0.71815	-0.00987	0.79707	-0.00796	0.87598	-0.00604
0.64127	-0.01174	0.72018	-0.00982	0.79909	-0.00791	0.87800	-0.00600
0.64329	-0.01169	0.72220	-0.00978	0.80111	-0.00786	0.88003	-0.00595
0.64531	-0.01164	0.72422	-0.00973	0.80314	-0.00781	0.88205	-0.00590
0.64734	-0.01159	0.72625	-0.00968	0.80516	-0.00776	0.88407	-0.00585
0.64936	-0.01154	0.72827	-0.00963	0.80718	-0.00771	0.88610	-0.00580
0.65138	-0.01149	0.73029	-0.00958	0.80921	-0.00766	0.88812	-0.00575
0.65341	-0.01144	0.73232	-0.00953	0.81123	-0.00762	0.89014	-0.00570
0.65543	-0.01140	0.73434	-0.00948	0.81325	-0.00757	0.89217	-0.00565
0.65745	-0.01135	0.73636	-0.00943	0.81528	-0.00752	0.89419	-0.00560
0.65948	-0.01130	0.73839	-0.00938	0.81730	-0.00747	0.89621	-0.00555
0.66150	-0.01125	0.74041	-0.00933	0.81932	-0.00742	0.89824	-0.00550
0.66352	-0.01120	0.74244	-0.00928	0.82135	-0.00737	0.90026	-0.00546
0.66555	-0.01115	0.74446	-0.00924	0.82337	-0.00732	0.90228	-0.00541
0.66757	-0.01110	0.74648	-0.00919	0.82539	-0.00727	0.90431	-0.00536
0.66959	-0.01105	0.74851	-0.00914	0.82742	-0.00722	0.90633	-0.00531
0.67162	-0.01100	0.75053	-0.00909	0.82944	-0.00717	0.90835	-0.00526
0.67364	-0.01095	0.75255	-0.00904	0.83146	-0.00712	0.91038	-0.00521
0.67566	-0.01090	0.75458	-0.00899	0.83349	-0.00708	0.91240	-0.00516
0.67769	-0.01086	0.75660	-0.00894	0.83551	-0.00703	0.91442	-0.00511
0.67971	-0.01081	0.75862	-0.00889	0.83753	-0.00698	0.91645	-0.00506
0.68173	-0.01076	0.76065	-0.00884	0.83956	-0.00693	0.91847	-0.00501
0.68376	-0.01071	0.76267	-0.00879	0.84158	-0.00688	0.92049	-0.00496
0.68578	-0.01066	0.76469	-0.00874	0.84360	-0.00683	0.92252	-0.00492
0.68780	-0.01061	0.76672	-0.00870	0.84563	-0.00678	0.92454	-0.00487
0.68983	-0.01056	0.76874	-0.00865	0.84765	-0.00673	0.92656	-0.00482

x/c	y/c
0.92859	-0.00477
0.93061	-0.00472
0.93263	-0.00467
0.93466	-0.00462
0.93668	-0.00457
0.93870	-0.00452
0.94073	-0.00447
0.94275	-0.00442
0.94477	-0.00438
0.94680	-0.00433

x/c	y/c
0.94882	-0.00428
0.95084	-0.00423
0.95287	-0.00418
0.95489	-0.00413
0.95691	-0.00408
0.95894	-0.00403
0.96096	-0.00398
0.96298	-0.00393
0.96501	-0.00388
0.96703	-0.00384

x/c	y/c
0.96906	-0.00379
0.97108	-0.00374
0.97310	-0.00369
0.97513	-0.00364
0.97715	-0.00359
0.97917	-0.00354
0.98120	-0.00349
0.98322	-0.00344
0.98524	-0.00339
0.98727	-0.00334

x/c	y/c
0.98929	-0.00330
0.99131	-0.00325
0.99334	-0.00320
0.99536	-0.00315
0.99738	-0.00310
0.99941	-0.00305
1.00000	-0.00161
1.00000	0.00042

Table 9. OML Station 2 upper surface airfoil coordinates, r/R = 0.2500

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
1.00000	0.00133	0.92699	0.00883	0.85252	0.01497	0.77805	0.02112
0.99945	0.00285	0.92498	0.00899	0.85051	0.01514	0.77603	0.02129
0.99744	0.00301	0.92297	0.00916	0.84849	0.01531	0.77402	0.02145
0.99543	0.00318	0.92095	0.00933	0.84648	0.01547	0.77201	0.02162
0.99341	0.00334	0.91894	0.00949	0.84447	0.01564	0.77000	0.02179
0.99140	0.00351	0.91693	0.00966	0.84246	0.01581	0.76798	0.02195
0.98939	0.00368	0.91492	0.00982	0.84044	0.01597	0.76597	0.02212
0.98738	0.00384	0.91290	0.00999	0.83843	0.01614	0.76396	0.02229
0.98536	0.00401	0.91089	0.01016	0.83642	0.01630	0.76194	0.02245
0.98335	0.00417	0.90888	0.01032	0.83440	0.01647	0.75993	0.02262
0.98134	0.00434	0.90686	0.01049	0.83239	0.01664	0.75792	0.02278
0.97932	0.00451	0.90485	0.01065	0.83038	0.01680	0.75591	0.02295
0.97731	0.00467	0.90284	0.01082	0.82837	0.01697	0.75389	0.02312
0.97530	0.00484	0.90083	0.01099	0.82635	0.01713	0.75188	0.02328
0.97329	0.00501	0.89881	0.01115	0.82434	0.01730	0.74987	0.02345
0.97127	0.00517	0.89680	0.01132	0.82233	0.01747	0.74785	0.02361
0.96926	0.00534	0.89479	0.01149	0.82031	0.01763	0.74584	0.02378
0.96725	0.00550	0.89278	0.01165	0.81830	0.01780	0.74383	0.02395
0.96524	0.00567	0.89076	0.01182	0.81629	0.01797	0.74182	0.02411
0.96322	0.00584	0.88875	0.01198	0.81428	0.01813	0.73980	0.02428
0.96121	0.00600	0.88674	0.01215	0.81226	0.01830	0.73779	0.02445
0.95920	0.00617	0.88472	0.01232	0.81025	0.01846	0.73578	0.02461
0.95718	0.00633	0.88271	0.01248	0.80824	0.01863	0.73377	0.02478
0.95517	0.00650	0.88070	0.01265	0.80623	0.01880	0.73175	0.02494
0.95316	0.00667	0.87869	0.01281	0.80421	0.01896	0.72974	0.02511
0.95115	0.00683	0.87667	0.01298	0.80220	0.01913	0.72773	0.02528
0.94913	0.00700	0.87466	0.01315	0.80019	0.01929	0.72571	0.02544
0.94712	0.00717	0.87265	0.01331	0.79817	0.01946	0.72370	0.02561
0.94511	0.00733	0.87063	0.01348	0.79616	0.01963	0.72169	0.02577
0.94309	0.00750	0.86862	0.01365	0.79415	0.01979	0.71968	0.02594
0.94108	0.00766	0.86661	0.01381	0.79214	0.01996	0.71766	0.02611
0.93907	0.00783	0.86460	0.01398	0.79012	0.02013	0.71565	0.02627
0.93706	0.00800	0.86258	0.01414	0.78811	0.02029	0.71364	0.02644
0.93504	0.00816	0.86057	0.01431	0.78610	0.02046	0.71162	0.02661
0.93303	0.00833	0.85856	0.01448	0.78408	0.02062	0.70961	0.02677
0.93102	0.00849	0.85654	0.01464	0.78207	0.02079	0.70760	0.02694
0.92901	0.00866	0.85453	0.01481	0.78006	0.02096	0.70559	0.02710

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.70357	0.02727	0.62508	0.03375	0.54658	0.04023	0.46808	0.04671
0.70156	0.02744	0.62306	0.03392	0.54456	0.04040	0.46607	0.04688
0.69955	0.02760	0.62105	0.03408	0.54255	0.04056	0.46405	0.04704
0.69754	0.02777	0.61904	0.03425	0.54054	0.04073	0.46204	0.04721
0.69552	0.02793	0.61702	0.03441	0.53853	0.04089	0.46003	0.04737
0.69351	0.02810	0.61501	0.03458	0.53651	0.04106	0.45801	0.04754
0.69150	0.02827	0.61300	0.03475	0.53450	0.04123	0.45600	0.04771
0.68948	0.02843	0.61099	0.03491	0.53249	0.04139	0.45399	0.04787
0.68747	0.02860	0.60897	0.03508	0.53047	0.04156	0.45198	0.04804
0.68546	0.02877	0.60696	0.03525	0.52846	0.04173	0.44996	0.04821
0.68345	0.02893	0.60495	0.03541	0.52645	0.04189	0.44795	0.04837
0.68143	0.02910	0.60293	0.03558	0.52444	0.04206	0.44594	0.04854
0.67942	0.02926	0.60092	0.03574	0.52242	0.04222	0.44392	0.04870
0.67741	0.02943	0.59891	0.03591	0.52041	0.04239	0.44191	0.04887
0.67539	0.02960	0.59690	0.03608	0.51840	0.04256	0.43990	0.04904
0.67338	0.02976	0.59488	0.03624	0.51638	0.04272	0.43789	0.04920
0.67137	0.02993	0.59287	0.03641	0.51437	0.04289	0.43587	0.04937
0.66936	0.03009	0.59086	0.03657	0.51236	0.04305	0.43386	0.04953
0.66734	0.03026	0.58884	0.03674	0.51035	0.04322	0.43185	0.04970
0.66533	0.03043	0.58683	0.03691	0.50833	0.04339	0.42984	0.04987
0.66332	0.03059	0.58482	0.03707	0.50632	0.04355	0.42782	0.05003
0.66131	0.03076	0.58281	0.03724	0.50431	0.04372	0.42581	0.05020
0.65929	0.03093	0.58079	0.03741	0.50230	0.04389	0.42380	0.05037
0.65728	0.03109	0.57878	0.03757	0.50028	0.04405	0.42178	0.05053
0.65527	0.03126	0.57677	0.03774	0.49827	0.04422	0.41977	0.05070
0.65325	0.03142	0.57476	0.03790	0.49626	0.04438	0.41776	0.05086
0.65124	0.03159	0.57274	0.03807	0.49424	0.04455	0.41575	0.05103
0.64923	0.03176	0.57073	0.03824	0.49223	0.04472	0.41373	0.05120
0.64722	0.03192	0.56872	0.03840	0.49022	0.04488	0.41172	0.05136
0.64520	0.03209	0.56670	0.03857	0.48821	0.04505	0.40971	0.05153
0.64319	0.03225	0.56469	0.03873	0.48619	0.04521	0.40769	0.05169
0.64118	0.03242	0.56268	0.03890	0.48418	0.04538	0.40568	0.05186
0.63916	0.03259	0.56067	0.03907	0.48217	0.04555	0.40367	0.05203
0.63715	0.03275	0.55865	0.03923	0.48015	0.04571	0.40166	0.05219
0.63514	0.03292	0.55664	0.03940	0.47814	0.04588	0.39964	0.05236
0.63313	0.03309	0.55463	0.03957	0.47613	0.04605	0.39763	0.05253
0.63111	0.03325	0.55261	0.03973	0.47412	0.04621	0.39562	0.05269
0.62910	0.03342	0.55060	0.03990	0.47210	0.04638	0.39361	0.05286
0.62709	0.03358	0.54859	0.04006	0.47009	0.04654	0.39159	0.05302

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.38958	0.05319	0.31135	0.05247	0.23357	0.04006	0.15579	0.02765
0.38757	0.05336	0.30936	0.05215	0.23158	0.03974	0.15380	0.02734
0.38555	0.05352	0.30737	0.05183	0.22958	0.03943	0.15180	0.02702
0.38354	0.05369	0.30537	0.05152	0.22759	0.03911	0.14981	0.02670
0.38153	0.05385	0.30338	0.05120	0.22559	0.03879	0.14781	0.02638
0.37952	0.05402	0.30138	0.05088	0.22360	0.03847	0.14582	0.02606
0.37750	0.05419	0.29939	0.05056	0.22161	0.03815	0.14382	0.02574
0.37549	0.05435	0.29739	0.05024	0.21961	0.03783	0.14183	0.02543
0.37348	0.05452	0.29540	0.04993	0.21762	0.03752	0.13984	0.02511
0.37146	0.05469	0.29340	0.04961	0.21562	0.03720	0.13784	0.02479
0.36945	0.05485	0.29141	0.04929	0.21363	0.03688	0.13585	0.02447
0.36744	0.05502	0.28942	0.04897	0.21163	0.03656	0.13385	0.02415
0.36543	0.05518	0.28742	0.04865	0.20964	0.03624	0.13186	0.02384
0.36341	0.05535	0.28543	0.04833	0.20764	0.03593	0.12986	0.02352
0.36140	0.05552	0.28343	0.04802	0.20565	0.03561	0.12787	0.02320
0.35939	0.05568	0.28144	0.04770	0.20366	0.03529	0.12587	0.02288
0.35738	0.05585	0.27944	0.04738	0.20166	0.03497	0.12388	0.02256
0.35536	0.05601	0.27745	0.04706	0.19967	0.03465	0.12189	0.02224
0.35335	0.05618	0.27545	0.04674	0.19767	0.03434	0.11989	0.02193
0.35134	0.05635	0.27346	0.04643	0.19568	0.03402	0.11790	0.02161
0.34932	0.05651	0.27147	0.04611	0.19368	0.03370	0.11590	0.02129
0.34731	0.05668	0.26947	0.04579	0.19169	0.03338	0.11391	0.02097
0.34530	0.05685	0.26748	0.04547	0.18970	0.03306	0.11191	0.02065
0.34329	0.05701	0.26548	0.04515	0.18770	0.03274	0.10992	0.02034
0.34127	0.05718	0.26349	0.04483	0.18571	0.03243	0.10792	0.02002
0.33928	0.05693	0.26149	0.04452	0.18371	0.03211	0.10593	0.01970
0.33728	0.05661	0.25950	0.04420	0.18172	0.03179	0.10394	0.01938
0.33529	0.05629	0.25751	0.04388	0.17972	0.03147	0.10194	0.01906
0.33329	0.05597	0.25551	0.04356	0.17773	0.03115	0.09995	0.01874
0.33130	0.05565	0.25352	0.04324	0.17573	0.03084	0.09795	0.01843
0.32930	0.05533	0.25152	0.04293	0.17374	0.03052	0.09596	0.01811
0.32731	0.05502	0.24953	0.04261	0.17175	0.03020	0.09396	0.01779
0.32532	0.05470	0.24753	0.04229	0.16975	0.02988	0.09197	0.01747
0.32332	0.05438	0.24554	0.04197	0.16776	0.02956	0.08997	0.01715
0.32133	0.05406	0.24354	0.04165	0.16576	0.02924	0.08798	0.01684
0.31933	0.05374	0.24155	0.04133	0.16377	0.02893	0.08599	0.01652
0.31734	0.05343	0.23956	0.04102	0.16177	0.02861	0.08399	0.01620
0.31534	0.05311	0.23756	0.04070	0.15978	0.02829	0.08200	0.01588
0.31335	0.05279	0.23557	0.04038	0.15778	0.02797	0.08000	0.01556

x/c	y/c
0.07801	0.01524
0.07601	0.01493
0.07402	0.01461
0.07203	0.01429
0.07003	0.01397
0.06804	0.01365
0.06604	0.01334
0.06405	0.01302
0.06205	0.01270
0.06006	0.01238
0.05806	0.01206

x/c	y/c
0.05607	0.01175
0.05408	0.01143
0.05208	0.01111
0.05009	0.01079
0.04809	0.01047
0.04610	0.01015
0.04410	0.00984
0.04211	0.00952
0.04011	0.00920
0.03812	0.00888
0.03613	0.00856

x/c	y/c
0.03413	0.00825
0.03214	0.00793
0.03014	0.00761
0.02815	0.00729
0.02615	0.00697
0.02416	0.00665
0.02216	0.00634
0.02017	0.00602
0.01818	0.00570
0.01618	0.00538
0.01419	0.00506

x/c	y/c
0.01219	0.00475
0.01020	0.00443
0.00820	0.00411
0.00621	0.00379
0.00422	0.00347
0.00222	0.00315
0.00023	0.00284
0.00000	0.00101

Table 10. OML Station 2 lower surface airfoil coordinates, r/R = 0.2500

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.00000	-0.00101	0.07230	-0.00745	0.14691	-0.01171	0.22151	-0.01597
0.00000	-0.00303	0.07432	-0.00756	0.14892	-0.01182	0.22353	-0.01609
0.00173	-0.00341	0.07634	-0.00768	0.15094	-0.01194	0.22554	-0.01620
0.00375	-0.00353	0.07835	-0.00779	0.15296	-0.01205	0.22756	-0.01632
0.00576	-0.00364	0.08037	-0.00791	0.15497	-0.01217	0.22958	-0.01643
0.00778	-0.00376	0.08238	-0.00802	0.15699	-0.01229	0.23159	-0.01655
0.00980	-0.00387	0.08440	-0.00814	0.15901	-0.01240	0.23361	-0.01666
0.01181	-0.00399	0.08642	-0.00825	0.16102	-0.01252	0.23563	-0.01678
0.01383	-0.00411	0.08843	-0.00837	0.16304	-0.01263	0.23764	-0.01689
0.01585	-0.00422	0.09045	-0.00848	0.16505	-0.01275	0.23966	-0.01701
0.01786	-0.00434	0.09247	-0.00860	0.16707	-0.01286	0.24168	-0.01712
0.01988	-0.00445	0.09448	-0.00871	0.16909	-0.01298	0.24369	-0.01724
0.02189	-0.00457	0.09650	-0.00883	0.17110	-0.01309	0.24571	-0.01735
0.02391	-0.00468	0.09852	-0.00894	0.17312	-0.01321	0.24772	-0.01747
0.02593	-0.00480	0.10053	-0.00906	0.17514	-0.01332	0.24974	-0.01759
0.02794	-0.00491	0.10255	-0.00917	0.17715	-0.01344	0.25176	-0.01770
0.02996	-0.00503	0.10456	-0.00929	0.17917	-0.01355	0.25377	-0.01782
0.03198	-0.00514	0.10658	-0.00941	0.18119	-0.01367	0.25579	-0.01793
0.03399	-0.00526	0.10860	-0.00952	0.18320	-0.01378	0.25781	-0.01805
0.03601	-0.00537	0.11061	-0.00964	0.18522	-0.01390	0.25982	-0.01816
0.03803	-0.00549	0.11263	-0.00975	0.18723	-0.01401	0.26184	-0.01828
0.04004	-0.00560	0.11465	-0.00987	0.18925	-0.01413	0.26386	-0.01839
0.04206	-0.00572	0.11666	-0.00998	0.19127	-0.01424	0.26587	-0.01851
0.04407	-0.00583	0.11868	-0.01010	0.19328	-0.01436	0.26789	-0.01862
0.04609	-0.00595	0.12070	-0.01021	0.19530	-0.01447	0.26990	-0.01874
0.04811	-0.00606	0.12271	-0.01033	0.19732	-0.01459	0.27192	-0.01885
0.05012	-0.00618	0.12473	-0.01044	0.19933	-0.01470	0.27394	-0.01897
0.05214	-0.00629	0.12674	-0.01056	0.20135	-0.01482	0.27595	-0.01908
0.05416	-0.00641	0.12876	-0.01067	0.20337	-0.01494	0.27797	-0.01920
0.05617	-0.00652	0.13078	-0.01079	0.20538	-0.01505	0.27999	-0.01931
0.05819	-0.00664	0.13279	-0.01090	0.20740	-0.01517	0.28200	-0.01943
0.06021	-0.00676	0.13481	-0.01102	0.20941	-0.01528	0.28402	-0.01954
0.06222	-0.00687	0.13683	-0.01113	0.21143	-0.01540	0.28604	-0.01966
0.06424	-0.00699	0.13884	-0.01125	0.21345	-0.01551	0.28805	-0.01977
0.06625	-0.00710	0.14086	-0.01136	0.21546	-0.01563	0.29007	-0.01989
0.06827	-0.00722	0.14287	-0.01148	0.21748	-0.01574	0.29208	-0.02000
0.07029	-0.00733	0.14489	-0.01159	0.21950	-0.01586	0.29410	-0.02012

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.29612	-0.02024	0.37479	-0.02180	0.45353	-0.01947	0.53226	-0.01714
0.29813	-0.02035	0.37681	-0.02174	0.45554	-0.01941	0.53428	-0.01709
0.30015	-0.02047	0.37883	-0.02168	0.45756	-0.01935	0.53629	-0.01703
0.30217	-0.02058	0.38085	-0.02162	0.45958	-0.01929	0.53831	-0.01697
0.30418	-0.02070	0.38287	-0.02156	0.46160	-0.01923	0.54033	-0.01691
0.30620	-0.02081	0.38489	-0.02150	0.46362	-0.01917	0.54235	-0.01685
0.30821	-0.02093	0.38691	-0.02144	0.46564	-0.01911	0.54437	-0.01679
0.31023	-0.02104	0.38893	-0.02138	0.46766	-0.01905	0.54639	-0.01673
0.31225	-0.02116	0.39094	-0.02132	0.46968	-0.01900	0.54841	-0.01667
0.31426	-0.02127	0.39296	-0.02126	0.47169	-0.01894	0.55043	-0.01661
0.31628	-0.02139	0.39498	-0.02120	0.47371	-0.01888	0.55244	-0.01655
0.31830	-0.02150	0.39700	-0.02114	0.47573	-0.01882	0.55446	-0.01649
0.32031	-0.02162	0.39902	-0.02108	0.47775	-0.01876	0.55648	-0.01643
0.32233	-0.02173	0.40104	-0.02102	0.47977	-0.01870	0.55850	-0.01637
0.32435	-0.02185	0.40306	-0.02096	0.48179	-0.01864	0.56052	-0.01631
0.32636	-0.02196	0.40508	-0.02091	0.48381	-0.01858	0.56254	-0.01625
0.32838	-0.02208	0.40709	-0.02085	0.48583	-0.01852	0.56456	-0.01619
0.33039	-0.02219	0.40911	-0.02079	0.48784	-0.01846	0.56658	-0.01613
0.33241	-0.02231	0.41113	-0.02073	0.48986	-0.01840	0.56859	-0.01607
0.33443	-0.02242	0.41315	-0.02067	0.49188	-0.01834	0.57061	-0.01601
0.33644	-0.02254	0.41517	-0.02061	0.49390	-0.01828	0.57263	-0.01595
0.33846	-0.02265	0.41719	-0.02055	0.49592	-0.01822	0.57465	-0.01589
0.34048	-0.02277	0.41921	-0.02049	0.49794	-0.01816	0.57667	-0.01583
0.34249	-0.02276	0.42123	-0.02043	0.49996	-0.01810	0.57869	-0.01577
0.34451	-0.02270	0.42324	-0.02037	0.50198	-0.01804	0.58071	-0.01571
0.34653	-0.02264	0.42526	-0.02031	0.50399	-0.01798	0.58273	-0.01565
0.34855	-0.02258	0.42728	-0.02025	0.50601	-0.01792	0.58474	-0.01559
0.35057	-0.02252	0.42930	-0.02019	0.50803	-0.01786	0.58676	-0.01553
0.35259	-0.02246	0.43132	-0.02013	0.51005	-0.01780	0.58878	-0.01547
0.35461	-0.02240	0.43334	-0.02007	0.51207	-0.01774	0.59080	-0.01541
0.35663	-0.02234	0.43536	-0.02001	0.51409	-0.01768	0.59282	-0.01535
0.35864	-0.02228	0.43738	-0.01995	0.51611	-0.01762	0.59484	-0.01529
0.36066	-0.02222	0.43939	-0.01989	0.51813	-0.01756	0.59686	-0.01523
0.36268	-0.02216	0.44141	-0.01983	0.52014	-0.01750	0.59888	-0.01518
0.36470	-0.02210	0.44343	-0.01977	0.52216	-0.01744	0.60089	-0.01512
0.36672	-0.02204	0.44545	-0.01971	0.52418	-0.01738	0.60291	-0.01506
0.36874	-0.02198	0.44747	-0.01965	0.52620	-0.01732	0.60493	-0.01500
0.37076	-0.02192	0.44949	-0.01959	0.52822	-0.01726	0.60695	-0.01494
0.37278	-0.02186	0.45151	-0.01953	0.53024	-0.01720	0.60897	-0.01488

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.61099	-0.01482	0.68972	-0.01249	0.76845	-0.01016	0.84718	-0.00783
0.61301	-0.01476	0.69174	-0.01243	0.77047	-0.01010	0.84920	-0.00777
0.61502	-0.01470	0.69376	-0.01237	0.77249	-0.01004	0.85122	-0.00771
0.61704	-0.01464	0.69577	-0.01231	0.77451	-0.00998	0.85324	-0.00765
0.61906	-0.01458	0.69779	-0.01225	0.77652	-0.00992	0.85526	-0.00759
0.62108	-0.01452	0.69981	-0.01219	0.77854	-0.00986	0.85727	-0.00754
0.62310	-0.01446	0.70183	-0.01213	0.78056	-0.00980	0.85929	-0.00748
0.62512	-0.01440	0.70385	-0.01207	0.78258	-0.00974	0.86131	-0.00742
0.62714	-0.01434	0.70587	-0.01201	0.78460	-0.00968	0.86333	-0.00736
0.62916	-0.01428	0.70789	-0.01195	0.78662	-0.00962	0.86535	-0.00730
0.63117	-0.01422	0.70991	-0.01189	0.78864	-0.00956	0.86737	-0.00724
0.63319	-0.01416	0.71192	-0.01183	0.79066	-0.00950	0.86939	-0.00718
0.63521	-0.01410	0.71394	-0.01177	0.79267	-0.00945	0.87141	-0.00712
0.63723	-0.01404	0.71596	-0.01171	0.79469	-0.00939	0.87342	-0.00706
0.63925	-0.01398	0.71798	-0.01165	0.79671	-0.00933	0.87544	-0.00700
0.64127	-0.01392	0.72000	-0.01159	0.79873	-0.00927	0.87746	-0.00694
0.64329	-0.01386	0.72202	-0.01153	0.80075	-0.00921	0.87948	-0.00688
0.64531	-0.01380	0.72404	-0.01147	0.80277	-0.00915	0.88150	-0.00682
0.64732	-0.01374	0.72606	-0.01141	0.80479	-0.00909	0.88352	-0.00676
0.64934	-0.01368	0.72807	-0.01136	0.80681	-0.00903	0.88554	-0.00670
0.65136	-0.01362	0.73009	-0.01130	0.80882	-0.00897	0.88756	-0.00664
0.65338	-0.01356	0.73211	-0.01124	0.81084	-0.00891	0.88957	-0.00658
0.65540	-0.01350	0.73413	-0.01118	0.81286	-0.00885	0.89159	-0.00652
0.65742	-0.01344	0.73615	-0.01112	0.81488	-0.00879	0.89361	-0.00646
0.65944	-0.01338	0.73817	-0.01106	0.81690	-0.00873	0.89563	-0.00640
0.66146	-0.01332	0.74019	-0.01100	0.81892	-0.00867	0.89765	-0.00634
0.66347	-0.01327	0.74221	-0.01094	0.82094	-0.00861	0.89967	-0.00628
0.66549	-0.01321	0.74422	-0.01088	0.82296	-0.00855	0.90169	-0.00622
0.66751	-0.01315	0.74624	-0.01082	0.82497	-0.00849	0.90371	-0.00616
0.66953	-0.01309	0.74826	-0.01076	0.82699	-0.00843	0.90572	-0.00610
0.67155	-0.01303	0.75028	-0.01070	0.82901	-0.00837	0.90774	-0.00604
0.67357	-0.01297	0.75230	-0.01064	0.83103	-0.00831	0.90976	-0.00598
0.67559	-0.01291	0.75432	-0.01058	0.83305	-0.00825	0.91178	-0.00592
0.67761	-0.01285	0.75634	-0.01052	0.83507	-0.00819	0.91380	-0.00586
0.67962	-0.01279	0.75836	-0.01046	0.83709	-0.00813	0.91582	-0.00580
0.68164	-0.01273	0.76037	-0.01040	0.83911	-0.00807	0.91784	-0.00574
0.68366	-0.01267	0.76239	-0.01034	0.84112	-0.00801	0.91986	-0.00568
0.68568	-0.01261	0.76441	-0.01028	0.84314	-0.00795	0.92187	-0.00562
0.68770	-0.01255	0.76643	-0.01022	0.84516	-0.00789	0.92389	-0.00557

x/c	y/c
0.92591	-0.00551
0.92793	-0.00545
0.92995	-0.00539
0.93197	-0.00533
0.93399	-0.00527
0.93601	-0.00521
0.93802	-0.00515
0.94004	-0.00509
0.94206	-0.00503
0.94408	-0.00497

x/c	y/c
0.94610	-0.00491
0.94812	-0.00485
0.95014	-0.00479
0.95216	-0.00473
0.95417	-0.00467
0.95619	-0.00461
0.95821	-0.00455
0.96023	-0.00449
0.96225	-0.00443
0.96427	-0.00437

x/c	y/c
0.96629	-0.00431
0.96831	-0.00425
0.97032	-0.00419
0.97234	-0.00413
0.97436	-0.00407
0.97638	-0.00401
0.97840	-0.00395
0.98042	-0.00389
0.98244	-0.00383
0.98446	-0.00377

x/c	y/c
0.98647	-0.00371
0.98849	-0.00366
0.99051	-0.00360
0.99253	-0.00354
0.99455	-0.00348
0.99657	-0.00342
0.99859	-0.00336
1.00000	-0.00271
1.00000	-0.00069

Table 11 OML Station 3 upper surface airfoil coordinates, r/R = 0.5000

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
1.00000	0.00074	0.92889	0.01331	0.85473	0.02321	0.78057	0.03310
1.00000	0.00276	0.92689	0.01358	0.85273	0.02347	0.77856	0.03337
0.99904	0.00395	0.92488	0.01384	0.85072	0.02374	0.77656	0.03364
0.99704	0.00421	0.92288	0.01411	0.84872	0.02401	0.77456	0.03391
0.99504	0.00448	0.92087	0.01438	0.84671	0.02428	0.77255	0.03417
0.99303	0.00475	0.91887	0.01465	0.84471	0.02454	0.77055	0.03444
0.99103	0.00502	0.91687	0.01491	0.84270	0.02481	0.76854	0.03471
0.98902	0.00528	0.91486	0.01518	0.84070	0.02508	0.76654	0.03498
0.98702	0.00555	0.91286	0.01545	0.83870	0.02535	0.76453	0.03524
0.98501	0.00582	0.91085	0.01572	0.83669	0.02561	0.76253	0.03551
0.98301	0.00609	0.90885	0.01598	0.83469	0.02588	0.76053	0.03578
0.98101	0.00635	0.90684	0.01625	0.83268	0.02615	0.75852	0.03605
0.97900	0.00662	0.90484	0.01652	0.83068	0.02642	0.75652	0.03631
0.97700	0.00689	0.90284	0.01679	0.82867	0.02668	0.75451	0.03658
0.97499	0.00716	0.90083	0.01705	0.82667	0.02695	0.75251	0.03685
0.97299	0.00742	0.89883	0.01732	0.82467	0.02722	0.75050	0.03712
0.97098	0.00769	0.89682	0.01759	0.82266	0.02749	0.74850	0.03738
0.96898	0.00796	0.89482	0.01786	0.82066	0.02775	0.74650	0.03765
0.96697	0.00823	0.89281	0.01812	0.81865	0.02802	0.74449	0.03792
0.96497	0.00849	0.89081	0.01839	0.81665	0.02829	0.74248	0.03812
0.96297	0.00876	0.88880	0.01866	0.81464	0.02856	0.74046	0.03815
0.96096	0.00903	0.88680	0.01893	0.81264	0.02882	0.73844	0.03818
0.95896	0.00930	0.88480	0.01919	0.81063	0.02909	0.73642	0.03821
0.95695	0.00956	0.88279	0.01946	0.80863	0.02936	0.73439	0.03823
0.95495	0.00983	0.88079	0.01973	0.80663	0.02963	0.73237	0.03826
0.95294	0.01010	0.87878	0.02000	0.80462	0.02989	0.73035	0.03829
0.95094	0.01037	0.87678	0.02026	0.80262	0.03016	0.72833	0.03831
0.94894	0.01063	0.87477	0.02053	0.80061	0.03043	0.72631	0.03834
0.94693	0.01090	0.87277	0.02080	0.79861	0.03070	0.72428	0.03837
0.94493	0.01117	0.87077	0.02107	0.79660	0.03096	0.72226	0.03839
0.94292	0.01144	0.86876	0.02133	0.79460	0.03123	0.72024	0.03842
0.94092	0.01170	0.86676	0.02160	0.79260	0.03150	0.71822	0.03845
0.93891	0.01197	0.86475	0.02187	0.79059	0.03177	0.71620	0.03847
0.93691	0.01224	0.86275	0.02214	0.78859	0.03203	0.71417	0.03850
0.93490	0.01251	0.86074	0.02240	0.78658	0.03230	0.71215	0.03853
0.93290	0.01277	0.85874	0.02267	0.78458	0.03257	0.71013	0.03855
0.93090	0.01304	0.85673	0.02294	0.78257	0.03284	0.70811	0.03858

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.70609	0.03861	0.62723	0.03966	0.54837	0.04070	0.46952	0.04175
0.70406	0.03864	0.62521	0.03968	0.54635	0.04073	0.46750	0.04178
0.70204	0.03866	0.62319	0.03971	0.54433	0.04076	0.46547	0.04181
0.70002	0.03869	0.62116	0.03974	0.54231	0.04079	0.46345	0.04183
0.69800	0.03872	0.61914	0.03976	0.54029	0.04081	0.46143	0.04186
0.69598	0.03874	0.61712	0.03979	0.53826	0.04084	0.45941	0.04189
0.69396	0.03877	0.61510	0.03982	0.53624	0.04087	0.45739	0.04191
0.69193	0.03880	0.61308	0.03984	0.53422	0.04089	0.45536	0.04194
0.68991	0.03882	0.61105	0.03987	0.53220	0.04092	0.45334	0.04197
0.68789	0.03885	0.60903	0.03990	0.53018	0.04095	0.45132	0.04199
0.68587	0.03888	0.60701	0.03993	0.52815	0.04097	0.44930	0.04202
0.68385	0.03890	0.60499	0.03995	0.52613	0.04100	0.44728	0.04205
0.68182	0.03893	0.60297	0.03998	0.52411	0.04103	0.44525	0.04207
0.67980	0.03896	0.60095	0.04001	0.52209	0.04105	0.44323	0.04210
0.67778	0.03898	0.59892	0.04003	0.52007	0.04108	0.44121	0.04213
0.67576	0.03901	0.59690	0.04006	0.51805	0.04111	0.43919	0.04216
0.67374	0.03904	0.59488	0.04009	0.51602	0.04113	0.43717	0.04218
0.67171	0.03907	0.59286	0.04011	0.51400	0.04116	0.43515	0.04221
0.66969	0.03909	0.59084	0.04014	0.51198	0.04119	0.43312	0.04224
0.66767	0.03912	0.58881	0.04017	0.50996	0.04122	0.43110	0.04226
0.66565	0.03915	0.58679	0.04019	0.50794	0.04124	0.42908	0.04229
0.66363	0.03917	0.58477	0.04022	0.50591	0.04127	0.42706	0.04232
0.66160	0.03920	0.58275	0.04025	0.50389	0.04130	0.42504	0.04234
0.65958	0.03923	0.58073	0.04027	0.50187	0.04132	0.42301	0.04237
0.65756	0.03925	0.57870	0.04030	0.49985	0.04135	0.42099	0.04240
0.65554	0.03928	0.57668	0.04033	0.49783	0.04138	0.41897	0.04242
0.65352	0.03931	0.57466	0.04036	0.49580	0.04140	0.41695	0.04245
0.65149	0.03933	0.57264	0.04038	0.49378	0.04143	0.41493	0.04248
0.64947	0.03936	0.57062	0.04041	0.49176	0.04146	0.41290	0.04250
0.64745	0.03939	0.56859	0.04044	0.48974	0.04148	0.41088	0.04253
0.64543	0.03941	0.56657	0.04046	0.48772	0.04151	0.40886	0.04256
0.64341	0.03944	0.56455	0.04049	0.48569	0.04154	0.40684	0.04259
0.64138	0.03947	0.56253	0.04052	0.48367	0.04156	0.40482	0.04261
0.63936	0.03950	0.56051	0.04054	0.48165	0.04159	0.40279	0.04264
0.63734	0.03952	0.55848	0.04057	0.47963	0.04162	0.40077	0.04267
0.63532	0.03955	0.55646	0.04060	0.47761	0.04164	0.39875	0.04269
0.63330	0.03958	0.55444	0.04062	0.47558	0.04167	0.39673	0.04272
0.63127	0.03960	0.55242	0.04065	0.47356	0.04170	0.39471	0.04275
0.62925	0.03963	0.55040	0.04068	0.47154	0.04173	0.39268	0.04277

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.39066	0.04280	0.31181	0.04385	0.23345	0.03703	0.15538	0.02592
0.38864	0.04283	0.30978	0.04388	0.23145	0.03674	0.15338	0.02564
0.38662	0.04285	0.30776	0.04390	0.22945	0.03646	0.15137	0.02535
0.38460	0.04288	0.30574	0.04393	0.22745	0.03617	0.14937	0.02507
0.38257	0.04291	0.30372	0.04396	0.22545	0.03589	0.14737	0.02478
0.38055	0.04293	0.30170	0.04398	0.22344	0.03560	0.14537	0.02450
0.37853	0.04296	0.29967	0.04401	0.22144	0.03532	0.14337	0.02421
0.37651	0.04299	0.29765	0.04404	0.21944	0.03503	0.14136	0.02393
0.37449	0.04302	0.29563	0.04406	0.21744	0.03475	0.13936	0.02364
0.37246	0.04304	0.29361	0.04409	0.21544	0.03446	0.13736	0.02336
0.37044	0.04307	0.29159	0.04412	0.21343	0.03418	0.13536	0.02307
0.36842	0.04310	0.28956	0.04414	0.21143	0.03389	0.13336	0.02279
0.36640	0.04312	0.28754	0.04417	0.20943	0.03361	0.13135	0.02250
0.36438	0.04315	0.28552	0.04420	0.20743	0.03333	0.12935	0.02222
0.36235	0.04318	0.28350	0.04415	0.20543	0.03304	0.12735	0.02193
0.36033	0.04320	0.28150	0.04386	0.20342	0.03276	0.12535	0.02165
0.35831	0.04323	0.27950	0.04358	0.20142	0.03247	0.12335	0.02136
0.35629	0.04326	0.27750	0.04329	0.19942	0.03219	0.12134	0.02108
0.35427	0.04328	0.27550	0.04301	0.19742	0.03190	0.11934	0.02079
0.35225	0.04331	0.27349	0.04272	0.19542	0.03162	0.11734	0.02051
0.35022	0.04334	0.27149	0.04244	0.19341	0.03133	0.11534	0.02023
0.34820	0.04336	0.26949	0.04215	0.19141	0.03105	0.11334	0.01994
0.34618	0.04339	0.26749	0.04187	0.18941	0.03076	0.11133	0.01966
0.34416	0.04342	0.26549	0.04158	0.18741	0.03048	0.10933	0.01937
0.34214	0.04345	0.26348	0.04130	0.18541	0.03019	0.10733	0.01909
0.34011	0.04347	0.26148	0.04101	0.18340	0.02991	0.10533	0.01880
0.33809	0.04350	0.25948	0.04073	0.18140	0.02962	0.10333	0.01852
0.33607	0.04353	0.25748	0.04045	0.17940	0.02934	0.10132	0.01823
0.33405	0.04355	0.25548	0.04016	0.17740	0.02905	0.09932	0.01795
0.33203	0.04358	0.25347	0.03988	0.17540	0.02877	0.09732	0.01766
0.33000	0.04361	0.25147	0.03959	0.17339	0.02848	0.09532	0.01738
0.32798	0.04363	0.24947	0.03931	0.17139	0.02820	0.09332	0.01709
0.32596	0.04366	0.24747	0.03902	0.16939	0.02791	0.09131	0.01681
0.32394	0.04369	0.24547	0.03874	0.16739	0.02763	0.08931	0.01652
0.32192	0.04371	0.24346	0.03845	0.16539	0.02734	0.08731	0.01624
0.31989	0.04374	0.24146	0.03817	0.16339	0.02706	0.08531	0.01595
0.31787	0.04377	0.23946	0.03788	0.16138	0.02678	0.08331	0.01567
0.31585	0.04379	0.23746	0.03760	0.15938	0.02649	0.08130	0.01538
0.31383	0.04382	0.23546	0.03731	0.15738	0.02621	0.07930	0.01510

x/c	y/c
0.07730	0.01481
0.07530	0.01453
0.07330	0.01424
0.07129	0.01396
0.06929	0.01368
0.06729	0.01339
0.06529	0.01311
0.06329	0.01282
0.06128	0.01254
0.05928	0.01225
0.05728	0.01197

x/c	y/c
0.05528	0.01168
0.05328	0.01140
0.05127	0.01111
0.04927	0.01083
0.04727	0.01054
0.04527	0.01026
0.04327	0.00997
0.04126	0.00969
0.03926	0.00940
0.03726	0.00912
0.03526	0.00883

x/c	y/c
0.03326	0.00855
0.03125	0.00826
0.02925	0.00798
0.02725	0.00769
0.02525	0.00741
0.02325	0.00712
0.02124	0.00684
0.01924	0.00656
0.01724	0.00627
0.01524	0.00599
0.01324	0.00570

x/c	y/c
0.01123	0.00542
0.00923	0.00513
0.00723	0.00485
0.00523	0.00456
0.00323	0.00428
0.00123	0.00399
0.00000	0.00303
0.00000	0.00101

Table 12 OML Station 3 lower surface airfoil coordinates, r/R = 0.5000

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.00000	-0.00101	0.07268	0.00687	0.14688	0.01647	0.22108	0.02607
0.00049	-0.00248	0.07469	0.00713	0.14889	0.01673	0.22309	0.02633
0.00249	-0.00222	0.07669	0.00738	0.15089	0.01699	0.22509	0.02659
0.00450	-0.00196	0.07870	0.00764	0.15290	0.01725	0.22710	0.02685
0.00650	-0.00170	0.08070	0.00790	0.15490	0.01751	0.22910	0.02711
0.00851	-0.00144	0.08271	0.00816	0.15691	0.01777	0.23111	0.02737
0.01051	-0.00118	0.08471	0.00842	0.15891	0.01803	0.23311	0.02763
0.01252	-0.00092	0.08672	0.00868	0.16092	0.01829	0.23512	0.02789
0.01452	-0.00066	0.08872	0.00894	0.16292	0.01855	0.23712	0.02815
0.01653	-0.00040	0.09073	0.00920	0.16493	0.01881	0.23913	0.02841
0.01854	-0.00014	0.09274	0.00946	0.16694	0.01907	0.24114	0.02867
0.02054	0.00012	0.09474	0.00972	0.16894	0.01933	0.24314	0.02893
0.02255	0.00038	0.09675	0.00998	0.17095	0.01958	0.24515	0.02919
0.02455	0.00064	0.09875	0.01024	0.17295	0.01984	0.24715	0.02945
0.02656	0.00090	0.10076	0.01050	0.17496	0.02010	0.24916	0.02971
0.02856	0.00115	0.10276	0.01076	0.17696	0.02036	0.25116	0.02997
0.03057	0.00141	0.10477	0.01102	0.17897	0.02062	0.25317	0.03023
0.03257	0.00167	0.10677	0.01128	0.18097	0.02088	0.25517	0.03049
0.03458	0.00193	0.10878	0.01154	0.18298	0.02114	0.25718	0.03075
0.03658	0.00219	0.11078	0.01180	0.18498	0.02140	0.25918	0.03101
0.03859	0.00245	0.11279	0.01206	0.18699	0.02166	0.26119	0.03127
0.04059	0.00271	0.11479	0.01232	0.18899	0.02192	0.26319	0.03152
0.04260	0.00297	0.11680	0.01258	0.19100	0.02218	0.26520	0.03178
0.04461	0.00323	0.11881	0.01284	0.19301	0.02244	0.26721	0.03204
0.04661	0.00349	0.12081	0.01310	0.19501	0.02270	0.26921	0.03230
0.04862	0.00375	0.12282	0.01335	0.19702	0.02296	0.27122	0.03256
0.05062	0.00401	0.12482	0.01361	0.19902	0.02322	0.27322	0.03282
0.05263	0.00427	0.12683	0.01387	0.20103	0.02348	0.27523	0.03308
0.05463	0.00453	0.12883	0.01413	0.20303	0.02374	0.27723	0.03334
0.05664	0.00479	0.13084	0.01439	0.20504	0.02400	0.27924	0.03360
0.05864	0.00505	0.13284	0.01465	0.20704	0.02426	0.28124	0.03386
0.06065	0.00531	0.13485	0.01491	0.20905	0.02452	0.28325	0.03412
0.06265	0.00557	0.13685	0.01517	0.21105	0.02478	0.28526	0.03420
0.06466	0.00583	0.13886	0.01543	0.21306	0.02504	0.28729	0.03417
0.06667	0.00609	0.14087	0.01569	0.21506	0.02530	0.28931	0.03415
0.06867	0.00635	0.14287	0.01595	0.21707	0.02555	0.29133	0.03412
0.07068	0.00661	0.14488	0.01621	0.21908	0.02581	0.29335	0.03409

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.29537	0.03407	0.37423	0.03302	0.45309	0.03197	0.53194	0.03092
0.29740	0.03404	0.37625	0.03299	0.45511	0.03194	0.53396	0.03090
0.29942	0.03401	0.37827	0.03297	0.45713	0.03192	0.53599	0.03087
0.30144	0.03399	0.38030	0.03294	0.45915	0.03189	0.53801	0.03084
0.30346	0.03396	0.38232	0.03291	0.46117	0.03186	0.54003	0.03082
0.30548	0.03393	0.38434	0.03288	0.46320	0.03184	0.54205	0.03079
0.30751	0.03391	0.38636	0.03286	0.46522	0.03181	0.54407	0.03076
0.30953	0.03388	0.38838	0.03283	0.46724	0.03178	0.54610	0.03073
0.31155	0.03385	0.39041	0.03280	0.46926	0.03176	0.54812	0.03071
0.31357	0.03382	0.39243	0.03278	0.47128	0.03173	0.55014	0.03068
0.31559	0.03380	0.39445	0.03275	0.47331	0.03170	0.55216	0.03065
0.31762	0.03377	0.39647	0.03272	0.47533	0.03168	0.55418	0.03063
0.31964	0.03374	0.39849	0.03270	0.47735	0.03165	0.55621	0.03060
0.32166	0.03372	0.40052	0.03267	0.47937	0.03162	0.55823	0.03057
0.32368	0.03369	0.40254	0.03264	0.48139	0.03159	0.56025	0.03055
0.32570	0.03366	0.40456	0.03262	0.48342	0.03157	0.56227	0.03052
0.32773	0.03364	0.40658	0.03259	0.48544	0.03154	0.56429	0.03049
0.32975	0.03361	0.40860	0.03256	0.48746	0.03151	0.56632	0.03047
0.33177	0.03358	0.41063	0.03254	0.48948	0.03149	0.56834	0.03044
0.33379	0.03356	0.41265	0.03251	0.49150	0.03146	0.57036	0.03041
0.33581	0.03353	0.41467	0.03248	0.49353	0.03143	0.57238	0.03039
0.33784	0.03350	0.41669	0.03245	0.49555	0.03141	0.57440	0.03036
0.33986	0.03348	0.41871	0.03243	0.49757	0.03138	0.57643	0.03033
0.34188	0.03345	0.42074	0.03240	0.49959	0.03135	0.57845	0.03030
0.34390	0.03342	0.42276	0.03237	0.50161	0.03133	0.58047	0.03028
0.34592	0.03340	0.42478	0.03235	0.50364	0.03130	0.58249	0.03025
0.34794	0.03337	0.42680	0.03232	0.50566	0.03127	0.58451	0.03022
0.34997	0.03334	0.42882	0.03229	0.50768	0.03125	0.58654	0.03020
0.35199	0.03331	0.43084	0.03227	0.50970	0.03122	0.58856	0.03017
0.35401	0.03329	0.43287	0.03224	0.51172	0.03119	0.59058	0.03014
0.35603	0.03326	0.43489	0.03221	0.51374	0.03116	0.59260	0.03012
0.35805	0.03323	0.43691	0.03219	0.51577	0.03114	0.59462	0.03009
0.36008	0.03321	0.43893	0.03216	0.51779	0.03111	0.59664	0.03006
0.36210	0.03318	0.44095	0.03213	0.51981	0.03108	0.59867	0.03004
0.36412	0.03315	0.44298	0.03211	0.52183	0.03106	0.60069	0.03001
0.36614	0.03313	0.44500	0.03208	0.52385	0.03103	0.60271	0.02998
0.36816	0.03310	0.44702	0.03205	0.52588	0.03100	0.60473	0.02996
0.37019	0.03307	0.44904	0.03202	0.52790	0.03098	0.60675	0.02993
0.37221	0.03305	0.45106	0.03200	0.52992	0.03095	0.60878	0.02990

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.61080	0.02987	0.68965	0.02883	0.76833	0.02509	0.84664	0.01575
0.61282	0.02985	0.69168	0.02880	0.77034	0.02485	0.84865	0.01551
0.61484	0.02982	0.69370	0.02877	0.77235	0.02462	0.85066	0.01527
0.61686	0.02979	0.69572	0.02875	0.77436	0.02438	0.85266	0.01503
0.61889	0.02977	0.69774	0.02872	0.77636	0.02414	0.85467	0.01479
0.62091	0.02974	0.69976	0.02869	0.77837	0.02390	0.85668	0.01455
0.62293	0.02971	0.70179	0.02867	0.78038	0.02366	0.85869	0.01432
0.62495	0.02969	0.70381	0.02864	0.78239	0.02342	0.86070	0.01408
0.62697	0.02966	0.70583	0.02861	0.78440	0.02318	0.86270	0.01384
0.62900	0.02963	0.70785	0.02858	0.78640	0.02294	0.86471	0.01360
0.63102	0.02961	0.70987	0.02856	0.78841	0.02270	0.86672	0.01336
0.63304	0.02958	0.71190	0.02853	0.79042	0.02246	0.86873	0.01312
0.63506	0.02955	0.71392	0.02850	0.79243	0.02222	0.87074	0.01288
0.63708	0.02953	0.71594	0.02848	0.79444	0.02198	0.87274	0.01264
0.63911	0.02950	0.71796	0.02845	0.79644	0.02174	0.87475	0.01240
0.64113	0.02947	0.71998	0.02842	0.79845	0.02150	0.87676	0.01216
0.64315	0.02944	0.72201	0.02840	0.80046	0.02126	0.87877	0.01192
0.64517	0.02942	0.72403	0.02837	0.80247	0.02102	0.88078	0.01168
0.64719	0.02939	0.72605	0.02834	0.80448	0.02078	0.88278	0.01144
0.64922	0.02936	0.72807	0.02832	0.80648	0.02054	0.88479	0.01120
0.65124	0.02934	0.73009	0.02829	0.80849	0.02030	0.88680	0.01096
0.65326	0.02931	0.73212	0.02826	0.81050	0.02006	0.88881	0.01072
0.65528	0.02928	0.73414	0.02824	0.81251	0.01982	0.89082	0.01048
0.65730	0.02926	0.73616	0.02821	0.81451	0.01958	0.89282	0.01024
0.65933	0.02923	0.73818	0.02818	0.81652	0.01935	0.89483	0.01000
0.66135	0.02920	0.74020	0.02815	0.81853	0.01911	0.89684	0.00976
0.66337	0.02918	0.74223	0.02813	0.82054	0.01887	0.89885	0.00953
0.66539	0.02915	0.74424	0.02797	0.82255	0.01863	0.90085	0.00929
0.66741	0.02912	0.74625	0.02773	0.82455	0.01839	0.90286	0.00905
0.66944	0.02910	0.74825	0.02749	0.82656	0.01815	0.90487	0.00881
0.67146	0.02907	0.75026	0.02725	0.82857	0.01791	0.90688	0.00857
0.67348	0.02904	0.75227	0.02701	0.83058	0.01767	0.90889	0.00833
0.67550	0.02901	0.75428	0.02677	0.83259	0.01743	0.91089	0.00809
0.67752	0.02899	0.75629	0.02653	0.83459	0.01719	0.91290	0.00785
0.67955	0.02896	0.75829	0.02629	0.83660	0.01695	0.91491	0.00761
0.68157	0.02893	0.76030	0.02605	0.83861	0.01671	0.91692	0.00737
0.68359	0.02891	0.76231	0.02581	0.84062	0.01647	0.91893	0.00713
0.68561	0.02888	0.76432	0.02557	0.84263	0.01623	0.92093	0.00689
0.68763	0.02885	0.76633	0.02533	0.84463	0.01599	0.92294	0.00665

x/c	y/c
0.92495	0.00641
0.92696	0.00617
0.92896	0.00593
0.93097	0.00569
0.93298	0.00545
0.93499	0.00521
0.93700	0.00497
0.93900	0.00473
0.94101	0.00450
0.94302	0.00426

x/c	y/c
0.94503	0.00402
0.94704	0.00378
0.94904	0.00354
0.95105	0.00330
0.95306	0.00306
0.95507	0.00282
0.95708	0.00258
0.95908	0.00234
0.96109	0.00210
0.96310	0.00186

x/c	y/c
0.96511	0.00162
0.96711	0.00138
0.96912	0.00114
0.97113	0.00090
0.97314	0.00066
0.97515	0.00042
0.97715	0.00018
0.97916	-0.00006
0.98117	-0.00030
0.98318	-0.00054

x/c	y/c
0.98519	-0.00077
0.98719	-0.00101
0.98920	-0.00125
0.99121	-0.00149
0.99322	-0.00173
0.99523	-0.00197
0.99723	-0.00221
0.99924	-0.00245
1.00000	-0.00128

Table 13 OML Station 4 upper surface airfoil coordinates, r/R = 0.7500

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
1.00000	0.00074	0.93043	0.02069	0.85602	0.02516	0.78129	0.02720
1.00000	0.00276	0.92846	0.02116	0.85400	0.02522	0.77927	0.02726
0.99918	0.00414	0.92650	0.02163	0.85198	0.02527	0.77725	0.02731
0.99722	0.00461	0.92454	0.02211	0.84996	0.02533	0.77523	0.02737
0.99525	0.00508	0.92257	0.02258	0.84794	0.02538	0.77321	0.02742
0.99329	0.00556	0.92061	0.02305	0.84592	0.02544	0.77120	0.02748
0.99132	0.00603	0.91863	0.02345	0.84390	0.02549	0.76918	0.02754
0.98936	0.00650	0.91661	0.02350	0.84188	0.02555	0.76716	0.02759
0.98739	0.00697	0.91459	0.02356	0.83986	0.02560	0.76514	0.02765
0.98543	0.00745	0.91257	0.02361	0.83784	0.02566	0.76312	0.02770
0.98347	0.00792	0.91055	0.02367	0.83583	0.02571	0.76110	0.02776
0.98150	0.00839	0.90853	0.02373	0.83381	0.02577	0.75908	0.02781
0.97954	0.00887	0.90651	0.02378	0.83179	0.02582	0.75706	0.02787
0.97757	0.00934	0.90449	0.02384	0.82977	0.02588	0.75504	0.02792
0.97561	0.00981	0.90247	0.02389	0.82775	0.02593	0.75302	0.02798
0.97364	0.01028	0.90046	0.02395	0.82573	0.02599	0.75100	0.02803
0.97168	0.01076	0.89844	0.02400	0.82371	0.02604	0.74898	0.02809
0.96971	0.01123	0.89642	0.02406	0.82169	0.02610	0.74696	0.02814
0.96775	0.01170	0.89440	0.02411	0.81967	0.02615	0.74494	0.02820
0.96579	0.01218	0.89238	0.02417	0.81765	0.02621	0.74292	0.02825
0.96382	0.01265	0.89036	0.02422	0.81563	0.02627	0.74090	0.02831
0.96186	0.01312	0.88834	0.02428	0.81361	0.02632	0.73888	0.02836
0.95989	0.01359	0.88632	0.02433	0.81159	0.02638	0.73686	0.02842
0.95793	0.01407	0.88430	0.02439	0.80957	0.02643	0.73484	0.02847
0.95596	0.01454	0.88228	0.02444	0.80755	0.02649	0.73282	0.02853
0.95400	0.01501	0.88026	0.02450	0.80553	0.02654	0.73080	0.02858
0.95204	0.01549	0.87824	0.02455	0.80351	0.02660	0.72878	0.02864
0.95007	0.01596	0.87622	0.02461	0.80149	0.02665	0.72676	0.02869
0.94811	0.01643	0.87420	0.02466	0.79947	0.02671	0.72474	0.02875
0.94614	0.01690	0.87218	0.02472	0.79745	0.02676	0.72272	0.02881
0.94418	0.01738	0.87016	0.02477	0.79543	0.02682	0.72070	0.02886
0.94221	0.01785	0.86814	0.02483	0.79341	0.02687	0.71868	0.02892
0.94025	0.01832	0.86612	0.02488	0.79139	0.02693	0.71666	0.02897
0.93829	0.01880	0.86410	0.02494	0.78937	0.02698	0.71464	0.02903
0.93632	0.01927	0.86208	0.02500	0.78735	0.02704	0.71262	0.02908
0.93436	0.01974	0.86006	0.02505	0.78533	0.02709	0.71060	0.02914
0.93239	0.02021	0.85804	0.02511	0.78331	0.02715	0.70858	0.02919

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.70656	0.02925	0.62780	0.03140	0.54903	0.03355	0.47026	0.03571
0.70455	0.02930	0.62578	0.03146	0.54701	0.03361	0.46824	0.03576
0.70253	0.02936	0.62376	0.03151	0.54499	0.03366	0.46622	0.03582
0.70051	0.02941	0.62174	0.03157	0.54297	0.03372	0.46420	0.03587
0.69849	0.02947	0.61972	0.03162	0.54095	0.03377	0.46218	0.03593
0.69647	0.02952	0.61770	0.03168	0.53893	0.03383	0.46016	0.03598
0.69445	0.02958	0.61568	0.03173	0.53691	0.03389	0.45814	0.03604
0.69243	0.02963	0.61366	0.03179	0.53489	0.03394	0.45612	0.03609
0.69041	0.02969	0.61164	0.03184	0.53287	0.03400	0.45410	0.03615
0.68839	0.02974	0.60962	0.03190	0.53085	0.03405	0.45208	0.03620
0.68637	0.02980	0.60760	0.03195	0.52883	0.03411	0.45006	0.03626
0.68435	0.02985	0.60558	0.03201	0.52681	0.03416	0.44804	0.03631
0.68233	0.02991	0.60356	0.03206	0.52479	0.03422	0.44602	0.03637
0.68031	0.02996	0.60154	0.03212	0.52277	0.03427	0.44401	0.03643
0.67829	0.03002	0.59952	0.03217	0.52075	0.03433	0.44199	0.03648
0.67627	0.03008	0.59750	0.03223	0.51873	0.03438	0.43997	0.03654
0.67425	0.03013	0.59548	0.03228	0.51671	0.03444	0.43795	0.03659
0.67223	0.03019	0.59346	0.03234	0.51469	0.03449	0.43593	0.03665
0.67021	0.03024	0.59144	0.03239	0.51267	0.03455	0.43391	0.03670
0.66819	0.03030	0.58942	0.03245	0.51065	0.03460	0.43189	0.03676
0.66617	0.03035	0.58740	0.03250	0.50864	0.03466	0.42987	0.03681
0.66415	0.03041	0.58538	0.03256	0.50662	0.03471	0.42785	0.03687
0.66213	0.03046	0.58336	0.03262	0.50460	0.03477	0.42583	0.03692
0.66011	0.03052	0.58134	0.03267	0.50258	0.03482	0.42381	0.03698
0.65809	0.03057	0.57932	0.03273	0.50056	0.03488	0.42179	0.03703
0.65607	0.03063	0.57730	0.03278	0.49854	0.03493	0.41977	0.03709
0.65405	0.03068	0.57529	0.03284	0.49652	0.03499	0.41775	0.03714
0.65203	0.03074	0.57327	0.03289	0.49450	0.03504	0.41573	0.03720
0.65001	0.03079	0.57125	0.03295	0.49248	0.03510	0.41371	0.03725
0.64799	0.03085	0.56923	0.03300	0.49046	0.03516	0.41169	0.03731
0.64597	0.03090	0.56721	0.03306	0.48844	0.03521	0.40967	0.03736
0.64395	0.03096	0.56519	0.03311	0.48642	0.03527	0.40765	0.03742
0.64193	0.03101	0.56317	0.03317	0.48440	0.03532	0.40563	0.03747
0.63992	0.03107	0.56115	0.03322	0.48238	0.03538	0.40361	0.03753
0.63790	0.03112	0.55913	0.03328	0.48036	0.03543	0.40159	0.03758
0.63588	0.03118	0.55711	0.03333	0.47834	0.03549	0.39957	0.03764
0.63386	0.03123	0.55509	0.03339	0.47632	0.03554	0.39755	0.03770
0.63184	0.03129	0.55307	0.03344	0.47430	0.03560	0.39553	0.03775
0.62982	0.03135	0.55105	0.03350	0.47228	0.03565	0.39351	0.03781

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.39149	0.03786	0.31296	0.03272	0.23449	0.02551	0.15603	0.01829
0.38947	0.03792	0.31095	0.03254	0.23248	0.02532	0.15402	0.01811
0.38745	0.03797	0.30894	0.03235	0.23047	0.02514	0.15200	0.01792
0.38543	0.03803	0.30692	0.03217	0.22846	0.02495	0.14999	0.01774
0.38341	0.03808	0.30491	0.03198	0.22645	0.02477	0.14798	0.01755
0.38139	0.03814	0.30290	0.03180	0.22443	0.02458	0.14597	0.01737
0.37938	0.03819	0.30089	0.03161	0.22242	0.02440	0.14396	0.01718
0.37736	0.03825	0.29888	0.03143	0.22041	0.02421	0.14194	0.01699
0.37534	0.03830	0.29686	0.03124	0.21840	0.02403	0.13993	0.01681
0.37332	0.03828	0.29485	0.03106	0.21639	0.02384	0.13792	0.01662
0.37131	0.03809	0.29284	0.03087	0.21437	0.02366	0.13591	0.01644
0.36929	0.03791	0.29083	0.03069	0.21236	0.02347	0.13390	0.01625
0.36728	0.03772	0.28882	0.03050	0.21035	0.02329	0.13188	0.01607
0.36527	0.03754	0.28680	0.03032	0.20834	0.02310	0.12987	0.01588
0.36326	0.03735	0.28479	0.03013	0.20633	0.02292	0.12786	0.01570
0.36125	0.03717	0.28278	0.02995	0.20431	0.02273	0.12585	0.01551
0.35923	0.03698	0.28077	0.02976	0.20230	0.02255	0.12384	0.01533
0.35722	0.03680	0.27876	0.02958	0.20029	0.02236	0.12182	0.01514
0.35521	0.03661	0.27674	0.02939	0.19828	0.02218	0.11981	0.01496
0.35320	0.03643	0.27473	0.02921	0.19627	0.02199	0.11780	0.01477
0.35119	0.03624	0.27272	0.02902	0.19425	0.02181	0.11579	0.01459
0.34918	0.03606	0.27071	0.02884	0.19224	0.02162	0.11378	0.01440
0.34716	0.03587	0.26870	0.02865	0.19023	0.02144	0.11176	0.01422
0.34515	0.03569	0.26669	0.02847	0.18822	0.02125	0.10975	0.01403
0.34314	0.03550	0.26467	0.02828	0.18621	0.02107	0.10774	0.01385
0.34113	0.03532	0.26266	0.02810	0.18420	0.02088	0.10573	0.01366
0.33912	0.03513	0.26065	0.02791	0.18218	0.02070	0.10372	0.01348
0.33710	0.03495	0.25864	0.02773	0.18017	0.02051	0.10171	0.01329
0.33509	0.03476	0.25663	0.02754	0.17816	0.02033	0.09969	0.01311
0.33308	0.03458	0.25461	0.02736	0.17615	0.02014	0.09768	0.01292
0.33107	0.03439	0.25260	0.02717	0.17414	0.01996	0.09567	0.01274
0.32906	0.03421	0.25059	0.02699	0.17212	0.01977	0.09366	0.01255
0.32704	0.03402	0.24858	0.02680	0.17011	0.01959	0.09165	0.01237
0.32503	0.03384	0.24657	0.02662	0.16810	0.01940	0.08963	0.01218
0.32302	0.03365	0.24455	0.02643	0.16609	0.01922	0.08762	0.01200
0.32101	0.03346	0.24254	0.02625	0.16408	0.01903	0.08561	0.01181
0.31900	0.03328	0.24053	0.02606	0.16206	0.01885	0.08360	0.01163
0.31698	0.03309	0.23852	0.02588	0.16005	0.01866	0.08159	0.01144
0.31497	0.03291	0.23651	0.02569	0.15804	0.01848	0.07957	0.01126

x/c	y/c
0.07756	0.01107
0.07555	0.01089
0.07354	0.01070
0.07153	0.01052
0.06951	0.01033
0.06750	0.01015
0.06549	0.00996
0.06348	0.00978
0.06147	0.00959
0.05945	0.00941
0.05744	0.00922

x/c	y/c
0.05543	0.00904
0.05342	0.00885
0.05141	0.00867
0.04939	0.00848
0.04738	0.00830
0.04537	0.00811
0.04336	0.00793
0.04135	0.00774
0.03933	0.00756
0.03732	0.00737
0.03531	0.00719

x/c	y/c
0.03330	0.00700
0.03129	0.00682
0.02927	0.00663
0.02726	0.00645
0.02525	0.00626
0.02324	0.00608
0.02123	0.00589
0.01921	0.00571
0.01720	0.00552
0.01519	0.00534
0.01318	0.00515

x/c	y/c
0.01117	0.00497
0.00916	0.00478
0.00714	0.00460
0.00513	0.00441
0.00312	0.00423
0.00111	0.00404
0.00000	0.00303
0.00000	0.00101

Table 14. OML Station 4 lower surface airfoil coordinates, r/R = 0.7500

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.00000	-0.00101	0.07282	0.00335	0.14732	0.00953	0.22183	0.01571
0.00034	-0.00266	0.07484	0.00352	0.14934	0.00970	0.22384	0.01588
0.00235	-0.00250	0.07685	0.00368	0.15135	0.00987	0.22585	0.01605
0.00436	-0.00233	0.07887	0.00385	0.15337	0.01003	0.22787	0.01621
0.00638	-0.00216	0.08088	0.00402	0.15538	0.01020	0.22988	0.01638
0.00839	-0.00200	0.08289	0.00419	0.15739	0.01037	0.23189	0.01655
0.01041	-0.00183	0.08491	0.00435	0.15941	0.01053	0.23391	0.01672
0.01242	-0.00166	0.08692	0.00452	0.16142	0.01070	0.23592	0.01688
0.01443	-0.00149	0.08893	0.00469	0.16343	0.01087	0.23793	0.01705
0.01645	-0.00133	0.09095	0.00485	0.16545	0.01104	0.23995	0.01722
0.01846	-0.00116	0.09296	0.00502	0.16746	0.01120	0.24196	0.01738
0.02047	-0.00099	0.09497	0.00519	0.16947	0.01137	0.24397	0.01755
0.02249	-0.00083	0.09699	0.00536	0.17149	0.01154	0.24599	0.01772
0.02450	-0.00066	0.09900	0.00552	0.17350	0.01170	0.24800	0.01788
0.02651	-0.00049	0.10101	0.00569	0.17551	0.01187	0.25001	0.01805
0.02853	-0.00033	0.10303	0.00586	0.17753	0.01204	0.25203	0.01822
0.03054	-0.00016	0.10504	0.00602	0.17954	0.01220	0.25404	0.01839
0.03255	0.00001	0.10705	0.00619	0.18155	0.01237	0.25606	0.01855
0.03457	0.00018	0.10907	0.00636	0.18357	0.01254	0.25807	0.01872
0.03658	0.00034	0.11108	0.00652	0.18558	0.01271	0.26008	0.01889
0.03859	0.00051	0.11309	0.00669	0.18760	0.01287	0.26210	0.01905
0.04061	0.00068	0.11511	0.00686	0.18961	0.01304	0.26411	0.01922
0.04262	0.00084	0.11712	0.00703	0.19162	0.01321	0.26612	0.01939
0.04464	0.00101	0.11914	0.00719	0.19364	0.01337	0.26814	0.01956
0.04665	0.00118	0.12115	0.00736	0.19565	0.01354	0.27015	0.01972
0.04866	0.00135	0.12316	0.00753	0.19766	0.01371	0.27216	0.01989
0.05068	0.00151	0.12518	0.00769	0.19968	0.01388	0.27418	0.02006
0.05269	0.00168	0.12719	0.00786	0.20169	0.01404	0.27619	0.02022
0.05470	0.00185	0.12920	0.00803	0.20370	0.01421	0.27820	0.02039
0.05672	0.00201	0.13122	0.00820	0.20572	0.01438	0.28022	0.02056
0.05873	0.00218	0.13323	0.00836	0.20773	0.01454	0.28223	0.02072
0.06074	0.00235	0.13524	0.00853	0.20974	0.01471	0.28424	0.02089
0.06276	0.00251	0.13726	0.00870	0.21176	0.01488	0.28626	0.02106
0.06477	0.00268	0.13927	0.00886	0.21377	0.01504	0.28827	0.02123
0.06678	0.00285	0.14128	0.00903	0.21578	0.01521	0.29029	0.02139
0.06880	0.00302	0.14330	0.00920	0.21780	0.01538	0.29230	0.02156
0.07081	0.00318	0.14531	0.00936	0.21981	0.01555	0.29431	0.02173

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.29633	0.02189	0.37486	0.02832	0.45362	0.02617	0.53239	0.02402
0.29834	0.02206	0.37688	0.02826	0.45564	0.02611	0.53441	0.02397
0.30035	0.02223	0.37890	0.02821	0.45766	0.02606	0.53643	0.02391
0.30237	0.02240	0.38092	0.02815	0.45968	0.02600	0.53845	0.02386
0.30438	0.02256	0.38293	0.02810	0.46170	0.02595	0.54047	0.02380
0.30639	0.02273	0.38495	0.02804	0.46372	0.02589	0.54249	0.02375
0.30841	0.02290	0.38697	0.02799	0.46574	0.02584	0.54451	0.02369
0.31042	0.02306	0.38899	0.02793	0.46776	0.02578	0.54653	0.02363
0.31243	0.02323	0.39101	0.02788	0.46978	0.02573	0.54855	0.02358
0.31445	0.02340	0.39303	0.02782	0.47180	0.02567	0.55057	0.02352
0.31646	0.02357	0.39505	0.02777	0.47382	0.02562	0.55259	0.02347
0.31847	0.02373	0.39707	0.02771	0.47584	0.02556	0.55461	0.02341
0.32049	0.02390	0.39909	0.02765	0.47786	0.02551	0.55663	0.02336
0.32250	0.02407	0.40111	0.02760	0.47988	0.02545	0.55865	0.02330
0.32452	0.02423	0.40313	0.02754	0.48190	0.02540	0.56067	0.02325
0.32653	0.02440	0.40515	0.02749	0.48392	0.02534	0.56269	0.02319
0.32854	0.02457	0.40717	0.02743	0.48594	0.02529	0.56471	0.02314
0.33056	0.02473	0.40919	0.02738	0.48796	0.02523	0.56673	0.02308
0.33257	0.02490	0.41121	0.02732	0.48998	0.02518	0.56875	0.02303
0.33458	0.02507	0.41323	0.02727	0.49200	0.02512	0.57077	0.02297
0.33660	0.02524	0.41525	0.02721	0.49402	0.02507	0.57279	0.02292
0.33861	0.02540	0.41727	0.02716	0.49604	0.02501	0.57481	0.02286
0.34062	0.02557	0.41929	0.02710	0.49806	0.02496	0.57683	0.02281
0.34264	0.02574	0.42131	0.02705	0.50008	0.02490	0.57885	0.02275
0.34465	0.02590	0.42333	0.02699	0.50210	0.02485	0.58086	0.02270
0.34666	0.02607	0.42535	0.02694	0.50412	0.02479	0.58288	0.02264
0.34868	0.02624	0.42737	0.02688	0.50614	0.02474	0.58490	0.02259
0.35069	0.02641	0.42939	0.02683	0.50816	0.02468	0.58692	0.02253
0.35270	0.02657	0.43141	0.02677	0.51018	0.02463	0.58894	0.02248
0.35472	0.02674	0.43343	0.02672	0.51220	0.02457	0.59096	0.02242
0.35673	0.02691	0.43545	0.02666	0.51421	0.02452	0.59298	0.02237
0.35875	0.02707	0.43747	0.02661	0.51623	0.02446	0.59500	0.02231
0.36076	0.02724	0.43949	0.02655	0.51825	0.02441	0.59702	0.02226
0.36277	0.02741	0.44151	0.02650	0.52027	0.02435	0.59904	0.02220
0.36479	0.02757	0.44353	0.02644	0.52229	0.02430	0.60106	0.02215
0.36680	0.02774	0.44555	0.02639	0.52431	0.02424	0.60308	0.02209
0.36881	0.02791	0.44757	0.02633	0.52633	0.02419	0.60510	0.02204
0.37083	0.02808	0.44958	0.02628	0.52835	0.02413	0.60712	0.02198
0.37284	0.02824	0.45160	0.02622	0.53037	0.02408	0.60914	0.02193

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.61116	0.02187	0.68993	0.01972	0.76870	0.01758	0.84746	0.01543
0.61318	0.02182	0.69195	0.01967	0.77072	0.01752	0.84948	0.01538
0.61520	0.02176	0.69397	0.01961	0.77274	0.01747	0.85150	0.01532
0.61722	0.02171	0.69599	0.01956	0.77476	0.01741	0.85352	0.01527
0.61924	0.02165	0.69801	0.01950	0.77678	0.01736	0.85554	0.01521
0.62126	0.02160	0.70003	0.01945	0.77879	0.01730	0.85756	0.01516
0.62328	0.02154	0.70205	0.01939	0.78081	0.01725	0.85958	0.01510
0.62530	0.02149	0.70407	0.01934	0.78283	0.01719	0.86160	0.01505
0.62732	0.02143	0.70609	0.01928	0.78485	0.01714	0.86362	0.01499
0.62934	0.02138	0.70811	0.01923	0.78687	0.01708	0.86564	0.01494
0.63136	0.02132	0.71013	0.01917	0.78889	0.01703	0.86766	0.01488
0.63338	0.02127	0.71215	0.01912	0.79091	0.01697	0.86968	0.01483
0.63540	0.02121	0.71416	0.01906	0.79293	0.01692	0.87170	0.01477
0.63742	0.02116	0.71618	0.01901	0.79495	0.01686	0.87372	0.01472
0.63944	0.02110	0.71820	0.01895	0.79697	0.01681	0.87574	0.01466
0.64146	0.02105	0.72022	0.01890	0.79899	0.01675	0.87776	0.01460
0.64348	0.02099	0.72224	0.01884	0.80101	0.01670	0.87978	0.01455
0.64550	0.02094	0.72426	0.01879	0.80303	0.01664	0.88180	0.01449
0.64751	0.02088	0.72628	0.01873	0.80505	0.01659	0.88382	0.01444
0.64953	0.02083	0.72830	0.01868	0.80707	0.01653	0.88584	0.01438
0.65155	0.02077	0.73032	0.01862	0.80909	0.01648	0.88786	0.01433
0.65357	0.02072	0.73234	0.01857	0.81111	0.01642	0.88988	0.01427
0.65559	0.02066	0.73436	0.01851	0.81313	0.01637	0.89190	0.01422
0.65761	0.02061	0.73638	0.01846	0.81515	0.01631	0.89392	0.01416
0.65963	0.02055	0.73840	0.01840	0.81717	0.01626	0.89594	0.01411
0.66165	0.02050	0.74042	0.01835	0.81919	0.01620	0.89796	0.01405
0.66367	0.02044	0.74244	0.01829	0.82121	0.01615	0.89998	0.01400
0.66569	0.02039	0.74446	0.01824	0.82323	0.01609	0.90200	0.01394
0.66771	0.02033	0.74648	0.01818	0.82525	0.01604	0.90402	0.01389
0.66973	0.02028	0.74850	0.01813	0.82727	0.01598	0.90604	0.01383
0.67175	0.02022	0.75052	0.01807	0.82929	0.01593	0.90806	0.01378
0.67377	0.02017	0.75254	0.01802	0.83131	0.01587	0.91008	0.01372
0.67579	0.02011	0.75456	0.01796	0.83333	0.01582	0.91209	0.01367
0.67781	0.02006	0.75658	0.01791	0.83535	0.01576	0.91411	0.01361
0.67983	0.02000	0.75860	0.01785	0.83737	0.01571	0.91613	0.01356
0.68185	0.01995	0.76062	0.01780	0.83939	0.01565	0.91815	0.01350
0.68387	0.01989	0.76264	0.01774	0.84141	0.01560	0.92015	0.01325
0.68589	0.01984	0.76466	0.01769	0.84343	0.01554	0.92213	0.01286
0.68791	0.01978	0.76668	0.01763	0.84544	0.01549	0.92411	0.01246

x/c	y/c
0.92610	0.01206
0.92808	0.01167
0.93006	0.01127
0.93204	0.01088
0.93402	0.01048
0.93600	0.01008
0.93798	0.00969
0.93996	0.00929
0.94195	0.00890
0.94393	0.00850

x/c	y/c
0.94591	0.00811
0.94789	0.00771
0.94987	0.00732
0.95185	0.00692
0.95383	0.00652
0.95582	0.00613
0.95780	0.00573
0.95978	0.00534
0.96176	0.00494
0.96374	0.00455

x/c	y/c
0.96572	0.00415
0.96770	0.00376
0.96968	0.00336
0.97167	0.00296
0.97365	0.00257
0.97563	0.00217
0.97761	0.00178
0.97959	0.00138
0.98157	0.00099
0.98355	0.00059

x/c	y/c
0.98554	0.00020
0.98752	-0.00020
0.98950	-0.00060
0.99148	-0.00099
0.99346	-0.00139
0.99544	-0.00178
0.99742	-0.00218
0.99940	-0.00257
1.00000	-0.00128

Table 15. OML Station 5 upper surface airfoil coordinates, r/R = 1.0000

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
1.00000	0.00101	0.93179	0.02221	0.85724	0.02698	0.78233	0.02903
1.00000	0.00304	0.92982	0.02269	0.85522	0.02704	0.78031	0.02909
1.00000	0.00506	0.92785	0.02316	0.85319	0.02709	0.77829	0.02914
0.99874	0.00610	0.92589	0.02364	0.85117	0.02715	0.77626	0.02920
0.99677	0.00657	0.92392	0.02411	0.84915	0.02720	0.77424	0.02925
0.99480	0.00704	0.92195	0.02458	0.84712	0.02726	0.77221	0.02931
0.99283	0.00752	0.91998	0.02506	0.84510	0.02731	0.77019	0.02936
0.99086	0.00799	0.91798	0.02532	0.84307	0.02737	0.76816	0.02942
0.98890	0.00847	0.91596	0.02538	0.84105	0.02742	0.76614	0.02947
0.98693	0.00894	0.91393	0.02543	0.83902	0.02748	0.76411	0.02953
0.98496	0.00941	0.91191	0.02549	0.83700	0.02754	0.76209	0.02958
0.98299	0.00989	0.90988	0.02554	0.83497	0.02759	0.76006	0.02964
0.98102	0.01036	0.90786	0.02560	0.83295	0.02765	0.75804	0.02969
0.97905	0.01084	0.90583	0.02565	0.83092	0.02770	0.75601	0.02975
0.97708	0.01131	0.90381	0.02571	0.82890	0.02776	0.75399	0.02980
0.97511	0.01179	0.90178	0.02576	0.82687	0.02781	0.75197	0.02986
0.97314	0.01226	0.89976	0.02582	0.82485	0.02787	0.74994	0.02992
0.97117	0.01273	0.89774	0.02587	0.82283	0.02792	0.74792	0.02997
0.96920	0.01321	0.89571	0.02593	0.82080	0.02798	0.74589	0.03003
0.96724	0.01368	0.89369	0.02599	0.81878	0.02803	0.74387	0.03008
0.96527	0.01416	0.89166	0.02604	0.81675	0.02809	0.74184	0.03014
0.96330	0.01463	0.88964	0.02610	0.81473	0.02814	0.73982	0.03019
0.96133	0.01510	0.88761	0.02615	0.81270	0.02820	0.73779	0.03025
0.95936	0.01558	0.88559	0.02621	0.81068	0.02825	0.73577	0.03030
0.95739	0.01605	0.88356	0.02626	0.80865	0.02831	0.73374	0.03036
0.95542	0.01653	0.88154	0.02632	0.80663	0.02837	0.73172	0.03041
0.95345	0.01700	0.87951	0.02637	0.80460	0.02842	0.72970	0.03047
0.95148	0.01747	0.87749	0.02643	0.80258	0.02848	0.72767	0.03052
0.94951	0.01795	0.87546	0.02648	0.80056	0.02853	0.72565	0.03058
0.94754	0.01842	0.87344	0.02654	0.79853	0.02859	0.72362	0.03063
0.94558	0.01890	0.87142	0.02659	0.79651	0.02864	0.72160	0.03069
0.94361	0.01937	0.86939	0.02665	0.79448	0.02870	0.71957	0.03075
0.94164	0.01984	0.86737	0.02671	0.79246	0.02875	0.71755	0.03080
0.93967	0.02032	0.86534	0.02676	0.79043	0.02881	0.71552	0.03086
0.93770	0.02079	0.86332	0.02682	0.78841	0.02886	0.71350	0.03091
0.93573	0.02127	0.86129	0.02687	0.78638	0.02892	0.71147	0.03097
0.93376	0.02174	0.85927	0.02693	0.78436	0.02897	0.70945	0.03102

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.70743	0.03108	0.62847	0.03324	0.54951	0.03540	0.47055	0.03755
0.70540	0.03113	0.62644	0.03329	0.54748	0.03545	0.46853	0.03761
0.70338	0.03119	0.62442	0.03335	0.54546	0.03551	0.46650	0.03766
0.70135	0.03124	0.62239	0.03340	0.54343	0.03556	0.46448	0.03772
0.69933	0.03130	0.62037	0.03346	0.54141	0.03562	0.46245	0.03778
0.69730	0.03135	0.61834	0.03351	0.53939	0.03567	0.46043	0.03783
0.69528	0.03141	0.61632	0.03357	0.53736	0.03573	0.45840	0.03789
0.69325	0.03147	0.61429	0.03362	0.53534	0.03578	0.45638	0.03794
0.69123	0.03152	0.61227	0.03368	0.53331	0.03584	0.45435	0.03800
0.68920	0.03158	0.61025	0.03373	0.53129	0.03589	0.45233	0.03805
0.68718	0.03163	0.60822	0.03379	0.52926	0.03595	0.45030	0.03811
0.68515	0.03169	0.60620	0.03385	0.52724	0.03600	0.44828	0.03816
0.68313	0.03174	0.60417	0.03390	0.52521	0.03606	0.44626	0.03822
0.68111	0.03180	0.60215	0.03396	0.52319	0.03611	0.44423	0.03827
0.67908	0.03185	0.60012	0.03401	0.52116	0.03617	0.44221	0.03833
0.67706	0.03191	0.59810	0.03407	0.51914	0.03623	0.44018	0.03838
0.67503	0.03196	0.59607	0.03412	0.51712	0.03628	0.43816	0.03844
0.67301	0.03202	0.59405	0.03418	0.51509	0.03634	0.43613	0.03849
0.67098	0.03207	0.59202	0.03423	0.51307	0.03639	0.43411	0.03855
0.66896	0.03213	0.59000	0.03429	0.51104	0.03645	0.43208	0.03861
0.66693	0.03218	0.58798	0.03434	0.50902	0.03650	0.43006	0.03866
0.66491	0.03224	0.58595	0.03440	0.50699	0.03656	0.42803	0.03872
0.66288	0.03230	0.58393	0.03445	0.50497	0.03661	0.42601	0.03877
0.66086	0.03235	0.58190	0.03451	0.50294	0.03667	0.42398	0.03883
0.65884	0.03241	0.57988	0.03456	0.50092	0.03672	0.42196	0.03888
0.65681	0.03246	0.57785	0.03462	0.49889	0.03678	0.41994	0.03894
0.65479	0.03252	0.57583	0.03468	0.49687	0.03683	0.41791	0.03899
0.65276	0.03257	0.57380	0.03473	0.49484	0.03689	0.41589	0.03905
0.65074	0.03263	0.57178	0.03479	0.49282	0.03694	0.41386	0.03910
0.64871	0.03268	0.56975	0.03484	0.49080	0.03700	0.41184	0.03916
0.64669	0.03274	0.56773	0.03490	0.48877	0.03706	0.40981	0.03921
0.64466	0.03279	0.56570	0.03495	0.48675	0.03711	0.40779	0.03927
0.64264	0.03285	0.56368	0.03501	0.48472	0.03717	0.40576	0.03933
0.64061	0.03290	0.56166	0.03506	0.48270	0.03722	0.40374	0.03938
0.63859	0.03296	0.55963	0.03512	0.48067	0.03728	0.40171	0.03944
0.63657	0.03302	0.55761	0.03517	0.47865	0.03733	0.39969	0.03949
0.63454	0.03307	0.55558	0.03523	0.47662	0.03739	0.39767	0.03955
0.63252	0.03313	0.55356	0.03528	0.47460	0.03744	0.39564	0.03960
0.63049	0.03318	0.55153	0.03534	0.47257	0.03750	0.39362	0.03966

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.39159	0.03971	0.31287	0.03457	0.23421	0.02734	0.15556	0.02010
0.38957	0.03977	0.31085	0.03439	0.23220	0.02715	0.15354	0.01992
0.38754	0.03982	0.30883	0.03420	0.23018	0.02696	0.15152	0.01973
0.38552	0.03988	0.30682	0.03401	0.22816	0.02678	0.14951	0.01954
0.38349	0.03993	0.30480	0.03383	0.22615	0.02659	0.14749	0.01936
0.38147	0.03999	0.30278	0.03364	0.22413	0.02641	0.14547	0.01917
0.37944	0.04004	0.30077	0.03346	0.22211	0.02622	0.14346	0.01899
0.37742	0.04010	0.29875	0.03327	0.22009	0.02604	0.14144	0.01880
0.37540	0.04016	0.29673	0.03309	0.21808	0.02585	0.13942	0.01862
0.37337	0.04014	0.29472	0.03290	0.21606	0.02567	0.13741	0.01843
0.37136	0.03995	0.29270	0.03272	0.21404	0.02548	0.13539	0.01825
0.36934	0.03976	0.29068	0.03253	0.21203	0.02530	0.13337	0.01806
0.36732	0.03958	0.28867	0.03234	0.21001	0.02511	0.13135	0.01788
0.36531	0.03939	0.28665	0.03216	0.20799	0.02492	0.12934	0.01769
0.36329	0.03921	0.28463	0.03197	0.20598	0.02474	0.12732	0.01750
0.36127	0.03902	0.28262	0.03179	0.20396	0.02455	0.12530	0.01732
0.35926	0.03884	0.28060	0.03160	0.20194	0.02437	0.12329	0.01713
0.35724	0.03865	0.27858	0.03142	0.19993	0.02418	0.12127	0.01695
0.35522	0.03847	0.27657	0.03123	0.19791	0.02400	0.11925	0.01676
0.35320	0.03828	0.27455	0.03105	0.19589	0.02381	0.11724	0.01658
0.35119	0.03810	0.27253	0.03086	0.19388	0.02363	0.11522	0.01639
0.34917	0.03791	0.27052	0.03068	0.19186	0.02344	0.11320	0.01621
0.34715	0.03772	0.26850	0.03049	0.18984	0.02325	0.11119	0.01602
0.34514	0.03754	0.26648	0.03030	0.18783	0.02307	0.10917	0.01583
0.34312	0.03735	0.26446	0.03012	0.18581	0.02288	0.10715	0.01565
0.34110	0.03717	0.26245	0.02993	0.18379	0.02270	0.10514	0.01546
0.33909	0.03698	0.26043	0.02975	0.18178	0.02251	0.10312	0.01528
0.33707	0.03680	0.25841	0.02956	0.17976	0.02233	0.10110	0.01509
0.33505	0.03661	0.25640	0.02938	0.17774	0.02214	0.09909	0.01491
0.33304	0.03643	0.25438	0.02919	0.17572	0.02196	0.09707	0.01472
0.33102	0.03624	0.25236	0.02901	0.17371	0.02177	0.09505	0.01454
0.32900	0.03605	0.25035	0.02882	0.17169	0.02159	0.09304	0.01435
0.32699	0.03587	0.24833	0.02863	0.16967	0.02140	0.09102	0.01417
0.32497	0.03568	0.24631	0.02845	0.16766	0.02121	0.08900	0.01398
0.32295	0.03550	0.24430	0.02826	0.16564	0.02103	0.08698	0.01379
0.32094	0.03531	0.24228	0.02808	0.16362	0.02084	0.08497	0.01361
0.31892	0.03513	0.24026	0.02789	0.16161	0.02066	0.08295	0.01342
0.31690	0.03494	0.23825	0.02771	0.15959	0.02047	0.08093	0.01324
0.31489	0.03476	0.23623	0.02752	0.15757	0.02029	0.07892	0.01305

x/c	y/c
0.07690	0.01287
0.07488	0.01268
0.07287	0.01250
0.07085	0.01231
0.06883	0.01212
0.06682	0.01194
0.06480	0.01175
0.06278	0.01157
0.06077	0.01138
0.05875	0.01120
0.05673	0.01101

x/c	y/c
0.05472	0.01083
0.05270	0.01064
0.05068	0.01046
0.04867	0.01027
0.04665	0.01008
0.04463	0.00990
0.04261	0.00971
0.04060	0.00953
0.03858	0.00934
0.03656	0.00916
0.03455	0.00897

x/c	y/c
0.03253	0.00879
0.03051	0.00860
0.02850	0.00841
0.02648	0.00823
0.02446	0.00804
0.02245	0.00786
0.02043	0.00767
0.01841	0.00749
0.01640	0.00730
0.01438	0.00712
0.01236	0.00693

x/c	y/c
0.01035	0.00675
0.00833	0.00656
0.00631	0.00637
0.00430	0.00619
0.00228	0.00600
0.00026	0.00582
0.00000	0.00403
0.00000	0.00201

Table 16. OML Station 5 lower surface airfoil coordinates, r/R = 1.0000

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.00000	-0.00002	0.07171	0.00339	0.14635	0.01001	0.22100	0.01663
0.00000	-0.00205	0.07373	0.00357	0.14837	0.01019	0.22301	0.01681
0.00110	-0.00287	0.07574	0.00375	0.15039	0.01037	0.22503	0.01699
0.00312	-0.00269	0.07776	0.00393	0.15240	0.01055	0.22705	0.01716
0.00513	-0.00251	0.07978	0.00411	0.15442	0.01072	0.22907	0.01734
0.00715	-0.00233	0.08180	0.00428	0.15644	0.01090	0.23108	0.01752
0.00917	-0.00215	0.08381	0.00446	0.15846	0.01108	0.23310	0.01770
0.01119	-0.00198	0.08583	0.00464	0.16047	0.01126	0.23512	0.01788
0.01320	-0.00180	0.08785	0.00482	0.16249	0.01144	0.23714	0.01806
0.01522	-0.00162	0.08986	0.00500	0.16451	0.01162	0.23915	0.01824
0.01724	-0.00144	0.09188	0.00518	0.16653	0.01180	0.24117	0.01842
0.01926	-0.00126	0.09390	0.00536	0.16854	0.01198	0.24319	0.01859
0.02127	-0.00108	0.09592	0.00554	0.17056	0.01216	0.24521	0.01877
0.02329	-0.00090	0.09793	0.00572	0.17258	0.01233	0.24722	0.01895
0.02531	-0.00072	0.09995	0.00589	0.17460	0.01251	0.24924	0.01913
0.02732	-0.00054	0.10197	0.00607	0.17661	0.01269	0.25126	0.01931
0.02934	-0.00037	0.10399	0.00625	0.17863	0.01287	0.25328	0.01949
0.03136	-0.00019	0.10600	0.00643	0.18065	0.01305	0.25529	0.01967
0.03338	-0.00001	0.10802	0.00661	0.18267	0.01323	0.25731	0.01985
0.03539	0.00017	0.11004	0.00679	0.18468	0.01341	0.25933	0.02003
0.03741	0.00035	0.11206	0.00697	0.18670	0.01359	0.26135	0.02020
0.03943	0.00053	0.11407	0.00715	0.18872	0.01377	0.26336	0.02038
0.04145	0.00071	0.11609	0.00733	0.19074	0.01394	0.26538	0.02056
0.04346	0.00089	0.11811	0.00750	0.19275	0.01412	0.26740	0.02074
0.04548	0.00107	0.12013	0.00768	0.19477	0.01430	0.26941	0.02092
0.04750	0.00124	0.12214	0.00786	0.19679	0.01448	0.27143	0.02110
0.04952	0.00142	0.12416	0.00804	0.19881	0.01466	0.27345	0.02128
0.05153	0.00160	0.12618	0.00822	0.20082	0.01484	0.27547	0.02146
0.05355	0.00178	0.12820	0.00840	0.20284	0.01502	0.27748	0.02164
0.05557	0.00196	0.13021	0.00858	0.20486	0.01520	0.27950	0.02181
0.05759	0.00214	0.13223	0.00876	0.20687	0.01538	0.28152	0.02199
0.05960	0.00232	0.13425	0.00894	0.20889	0.01555	0.28354	0.02217
0.06162	0.00250	0.13627	0.00911	0.21091	0.01573	0.28555	0.02235
0.06364	0.00267	0.13828	0.00929	0.21293	0.01591	0.28757	0.02253
0.06566	0.00285	0.14030	0.00947	0.21494	0.01609	0.28959	0.02271
0.06767	0.00303	0.14232	0.00965	0.21696	0.01627	0.29161	0.02289
0.06969	0.00321	0.14433	0.00983	0.21898	0.01645	0.29362	0.02307

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.29564	0.02325	0.37432	0.03018	0.45328	0.02803	0.53224	0.02588
0.29766	0.02342	0.37635	0.03013	0.45530	0.02798	0.53426	0.02582
0.29968	0.02360	0.37837	0.03007	0.45733	0.02792	0.53629	0.02577
0.30169	0.02378	0.38040	0.03002	0.45935	0.02787	0.53831	0.02571
0.30371	0.02396	0.38242	0.02996	0.46138	0.02781	0.54034	0.02566
0.30573	0.02414	0.38444	0.02991	0.46340	0.02776	0.54236	0.02560
0.30775	0.02432	0.38647	0.02985	0.46543	0.02770	0.54439	0.02555
0.30976	0.02450	0.38849	0.02980	0.46745	0.02765	0.54641	0.02549
0.31178	0.02468	0.39052	0.02974	0.46948	0.02759	0.54844	0.02544
0.31380	0.02486	0.39254	0.02969	0.47150	0.02753	0.55046	0.02538
0.31582	0.02503	0.39457	0.02963	0.47353	0.02748	0.55248	0.02533
0.31783	0.02521	0.39659	0.02958	0.47555	0.02742	0.55451	0.02527
0.31985	0.02539	0.39862	0.02952	0.47757	0.02737	0.55653	0.02522
0.32187	0.02557	0.40064	0.02947	0.47960	0.02731	0.55856	0.02516
0.32388	0.02575	0.40267	0.02941	0.48162	0.02726	0.56058	0.02511
0.32590	0.02593	0.40469	0.02936	0.48365	0.02720	0.56261	0.02505
0.32792	0.02611	0.40671	0.02930	0.48567	0.02715	0.56463	0.02500
0.32994	0.02629	0.40874	0.02925	0.48770	0.02709	0.56666	0.02494
0.33195	0.02647	0.41076	0.02919	0.48972	0.02704	0.56868	0.02489
0.33397	0.02664	0.41279	0.02914	0.49175	0.02698	0.57071	0.02483
0.33599	0.02682	0.41481	0.02908	0.49377	0.02693	0.57273	0.02477
0.33801	0.02700	0.41684	0.02903	0.49580	0.02687	0.57475	0.02472
0.34002	0.02718	0.41886	0.02897	0.49782	0.02682	0.57678	0.02466
0.34204	0.02736	0.42089	0.02892	0.49985	0.02676	0.57880	0.02461
0.34406	0.02754	0.42291	0.02886	0.50187	0.02671	0.58083	0.02455
0.34608	0.02772	0.42494	0.02880	0.50389	0.02665	0.58285	0.02450
0.34809	0.02790	0.42696	0.02875	0.50592	0.02660	0.58488	0.02444
0.35011	0.02808	0.42899	0.02869	0.50794	0.02654	0.58690	0.02439
0.35213	0.02825	0.43101	0.02864	0.50997	0.02649	0.58893	0.02433
0.35415	0.02843	0.43303	0.02858	0.51199	0.02643	0.59095	0.02428
0.35616	0.02861	0.43506	0.02853	0.51402	0.02638	0.59298	0.02422
0.35818	0.02879	0.43708	0.02847	0.51604	0.02632	0.59500	0.02417
0.36020	0.02897	0.43911	0.02842	0.51807	0.02627	0.59702	0.02411
0.36222	0.02915	0.44113	0.02836	0.52009	0.02621	0.59905	0.02406
0.36423	0.02933	0.44316	0.02831	0.52212	0.02615	0.60107	0.02400
0.36625	0.02951	0.44518	0.02825	0.52414	0.02610	0.60310	0.02395
0.36827	0.02969	0.44721	0.02820	0.52616	0.02604	0.60512	0.02389
0.37029	0.02986	0.44923	0.02814	0.52819	0.02599	0.60715	0.02384
0.37230	0.03004	0.45126	0.02809	0.53021	0.02593	0.60917	0.02378

x/c	y/c	x/c	y/c	x/c	y/c	x/c	y/c
0.61120	0.02373	0.69016	0.02157	0.76911	0.01942	0.84807	0.01727
0.61322	0.02367	0.69218	0.02152	0.77114	0.01937	0.85010	0.01721
0.61525	0.02362	0.69420	0.02146	0.77316	0.01931	0.85212	0.01716
0.61727	0.02356	0.69623	0.02141	0.77519	0.01925	0.85415	0.01710
0.61930	0.02351	0.69825	0.02135	0.77721	0.01920	0.85617	0.01705
0.62132	0.02345	0.70028	0.02130	0.77924	0.01914	0.85820	0.01699
0.62334	0.02339	0.70230	0.02124	0.78126	0.01909	0.86022	0.01694
0.62537	0.02334	0.70433	0.02119	0.78329	0.01903	0.86224	0.01688
0.62739	0.02328	0.70635	0.02113	0.78531	0.01898	0.86427	0.01683
0.62942	0.02323	0.70838	0.02108	0.78734	0.01892	0.86629	0.01677
0.63144	0.02317	0.71040	0.02102	0.78936	0.01887	0.86832	0.01672
0.63347	0.02312	0.71243	0.02097	0.79138	0.01881	0.87034	0.01666
0.63549	0.02306	0.71445	0.02091	0.79341	0.01876	0.87237	0.01660
0.63752	0.02301	0.71648	0.02086	0.79543	0.01870	0.87439	0.01655
0.63954	0.02295	0.71850	0.02080	0.79746	0.01865	0.87642	0.01649
0.64157	0.02290	0.72052	0.02075	0.79948	0.01859	0.87844	0.01644
0.64359	0.02284	0.72255	0.02069	0.80151	0.01854	0.88047	0.01638
0.64561	0.02279	0.72457	0.02063	0.80353	0.01848	0.88249	0.01633
0.64764	0.02273	0.72660	0.02058	0.80556	0.01843	0.88452	0.01627
0.64966	0.02268	0.72862	0.02052	0.80758	0.01837	0.88654	0.01622
0.65169	0.02262	0.73065	0.02047	0.80961	0.01832	0.88856	0.01616
0.65371	0.02257	0.73267	0.02041	0.81163	0.01826	0.89059	0.01611
0.65574	0.02251	0.73470	0.02036	0.81365	0.01821	0.89261	0.01605
0.65776	0.02246	0.73672	0.02030	0.81568	0.01815	0.89464	0.01600
0.65979	0.02240	0.73875	0.02025	0.81770	0.01810	0.89666	0.01594
0.66181	0.02235	0.74077	0.02019	0.81973	0.01804	0.89869	0.01589
0.66384	0.02229	0.74279	0.02014	0.82175	0.01798	0.90071	0.01583
0.66586	0.02224	0.74482	0.02008	0.82378	0.01793	0.90274	0.01578
0.66789	0.02218	0.74684	0.02003	0.82580	0.01787	0.90476	0.01572
0.66991	0.02213	0.74887	0.01997	0.82783	0.01782	0.90679	0.01567
0.67193	0.02207	0.75089	0.01992	0.82985	0.01776	0.90881	0.01561
0.67396	0.02201	0.75292	0.01986	0.83188	0.01771	0.91083	0.01556
0.67598	0.02196	0.75494	0.01981	0.83390	0.01765	0.91286	0.01550
0.67801	0.02190	0.75697	0.01975	0.83593	0.01760	0.91488	0.01545
0.68003	0.02185	0.75899	0.01970	0.83795	0.01754	0.91691	0.01539
0.68206	0.02179	0.76102	0.01964	0.83997	0.01749	0.91893	0.01534
0.68408	0.02174	0.76304	0.01959	0.84200	0.01743	0.92091	0.01490
0.68611	0.02168	0.76506	0.01953	0.84402	0.01738	0.92289	0.01446
0.68813	0.02163	0.76709	0.01948	0.84605	0.01732	0.92486	0.01401

x/c	y/c
0.92684	0.01356
0.92881	0.01312
0.93079	0.01267
0.93276	0.01222
0.93474	0.01178
0.93671	0.01133
0.93869	0.01088
0.94067	0.01044
0.94264	0.00999
0.94462	0.00955

x/c	y/c
0.94659	0.00910
0.94857	0.00865
0.95054	0.00821
0.95252	0.00776
0.95449	0.00731
0.95647	0.00687
0.95845	0.00642
0.96042	0.00597
0.96240	0.00553
0.96437	0.00508

x/c	y/c
0.96635	0.00464
0.96832	0.00419
0.97030	0.00374
0.97227	0.00330
0.97425	0.00285
0.97622	0.00240
0.97820	0.00196
0.98018	0.00151
0.98215	0.00107
0.98413	0.00062

x/c	y/c
0.98610	0.00017
0.98808	-0.00027
0.99005	-0.00072
0.99203	-0.00117
0.99400	-0.00161
0.99598	-0.00206
0.99796	-0.00251
0.99993	-0.00295
1.00000	-0.00101

APPENDIX C

Descriptions and original filenames of tabulated data presented in this report are listed in Table 17.

Table 17. Source files for data presented in this report

Description	Creation Date	Reference	Filename
Design airfoil coordinates	4/3/2020 (v1), 8/2/2022 (v3)	Table 3 through Table 6, Figure 5, Figure 6	'MSH HEX Geometry optimization v3.xlsx'
OML Station 1 upper surface airfoil coordinates, r/R = 0.090	10/24/24	Table 7	'msh-oml-rhino-rr0.0900-st1_US.csv'
OML Station 1 lower surface airfoil coordinates, r/R = 0.090	10/24/24	Table 8	'msh-oml-rhino-rr0.0900-st1_LS.csv'
OML Station 2 upper surface airfoil coordinates, r/R = 0.250	10/24/24	Table 9	'msh-oml-rhino-rr0.2500-st2_US.csv'
OML Station 2 lower surface airfoil coordinates, r/R = 0.250	10/24/24	Table 10	'msh-oml-rhino-rr0.2500-st2_LS.csv'
OML Station 3 upper surface airfoil coordinates, r/R = 0.500	10/24/24	Table 11	'msh-oml-rhino-rr0.5000-st3_US.csv'
OML Station 3 lower surface airfoil coordinates, r/R = 0.500	10/24/24	Table 12	'msh-oml-rhino-rr0.5000-st3_LS.csv'
OML Station 4 upper surface airfoil coordinates, r/R = 0.750	10/24/24	Table 13	'msh-oml-rhino-rr0.7500-st4_US.csv'
OML Station 4 lower surface airfoil coordinates, r/R = 0.750	10/24/24	Table 14	'msh-oml-rhino-rr0.7500-st4_LS.csv'
OML Station 5 upper surface airfoil coordinates, r/R = 1.000	10/24/24	Table 15	'msh-oml-rhino-rr1.0000-st5_US.csv'
OML Station 5 lower surface airfoil coordinates, r/R = 1.000	10/24/24	Table 16	'msh-oml-rhino-rr1.0000-st5_LS.csv'