FM a273 Muldowney & Higdon : Resistance function.. available from j-higdon@uiuc.edu

Table 4 (*a*) R_x $m = 2$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.081189	2.11407	4.88280	4.10280	3.25695	9.83175	2.79617	0.35591
0.10	1.175987	2.24146	5.23098	3.92110	3.65056	11.70653	3.02450	0.37331
0.20	1.418605	2.51394	5.72111	3.46793	4.04377	16.35514	3.53239	0.41407
0.30	1.761890	2.87909	5.76680	2.97387	3.66948	22.01892	4.09466	0.46521
0.40	2.265253	3.40812	6.00114	2.68264	3.28157	30.83461	4.83016	0.53001
0.50	3.041764	4.23481	6.24787	2.48445	2.74589	44.34218	5.77700	0.61520
0.60	4.332705	5.62712	6.29047	2.25475	2.01748	64.68695	6.96697	0.73293
0.70	6.746020	8.26559	6.20072	1.98094	1.30683	99.21453	8.53664	0.90717
0.80	12.297919	14.45479	5.38049	1.40404	0.62974	156.17856	10.26081	1.19996
0.90	32.853023	38.25527	-1.20994	-0.48200	-0.61993	34.72451	6.41284	1.85501

Table 4 (*b*) R_y $m = 2$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.081189	0.80225	-0.20279	0.12091	-0.28701	-0.43361	0.26721	
0.10	1.175987	0.80704	-0.18801	0.09450	-0.35609	-0.50638	0.29903	
0.20	1.418605	0.86647	-0.31581	0.06655	-0.53636	-0.74607	0.38115	
0.30	1.761890	0.95873	-0.50069	0.10842	-0.76260	-1.16417	0.49975	
0.40	2.265253	1.10105	-0.67898	0.15965	-0.93531	-1.86345	0.67947	
0.50	3.041764	1.34066	-0.90712	0.22710	-1.12637	-3.19494	0.96975	
0.60	4.332704	1.76327	-1.17450	0.22410	-1.27753	-5.91747	1.48232	
0.70	6.746020	2.60818	-1.54745	0.12642	-1.35513	-11.87157	2.51826	
0.80	12.297918	4.65174	-2.19125	-0.09994	-1.46860	-27.88687	5.16016	
0.90	32.853021	12.66360	-3.09283	-0.62719	-1.34755	-60.60280	16.49884	

Table 4 (c) R_z $m = 1$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.095956	-0.47235		0.23343	-0.29823	-0.37659	0.25126	
0.10	1.211138	-0.58448		0.31464	-0.41120	-0.38395	0.26352	
0.20	1.520913	-0.81601		0.46841	-0.52084	-0.36550	0.29166	
0.30	1.995136	-1.14830		0.66361	-0.58592	-0.31114	0.32597	
0.40	2.764673	-1.69446		0.98245	-0.71980	-0.23266	0.36886	
0.50	4.119725	-2.66992		1.55823	-1.00690	-0.16983	0.42426	
0.60	6.807034	-4.62666		2.71399	-1.61220	-0.31068	0.49931	
0.70	13.219602	-9.38565		5.56955	-3.04104	-1.45734	0.60858	
0.80	34.418424	-25.56444		15.51527	-8.50838	-15.57029	0.78920	
0.90	182.948680	-143.76721		86.53006	-56.58537	-532.95790	1.18585	

Table 4 (d) R_p $m = 2$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.094904	-2.15910	1.33014	0.01911	-0.02989			
0.10	1.206335	-2.27270	1.38776	0.00894	-0.03806			
0.20	1.496518	-2.48605	1.40626	-0.03792	-0.04136			
0.30	1.922298	-2.79708	1.49050	-0.11580	-0.03038			
0.40	2.582120	-3.29496	1.73607	-0.26091	0.01129			
0.50	3.684843	-4.14426	2.26738	-0.55945	0.12410			
0.60	5.743648	-5.74428	3.35101	-1.17003	0.36104			
0.70	10.321402	-9.32325	5.80567	-2.48406	0.80674			
0.80	24.230866	-20.35197	13.77885	-7.00520	2.35073			
0.90	111.921804	-91.46132	67.53417	-38.89252	13.03322			

Table 4 Resistance functions **R** for droplets with viscosity ratio $\lambda = 1$ in cylindrical tubes. Coefficients c_i as defined in equations (24, 25). Exponent m as defined for functions ψ_3, ψ_4 in (23). Coefficient c_0 is resistance function for sphere at center of tube.

Table 5 (*a*) R_x $m = 1$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.063994	1.67100		0.21356		0.06228	0.29200	0.39461
0.10	1.136739	1.73358		0.18593		0.05208	0.27904	0.41609
0.20	1.316767	1.87155		0.12869		0.01250	0.24258	0.46585
0.30	1.564152	2.08892		0.08999		-0.03827	0.19030	0.52731
0.40	1.923312	2.45450		0.06792		-0.13609	0.10259	0.60515
0.50	2.483111	3.08671		0.05254		-0.37218	-0.05428	0.70711
0.60	3.441766	4.23413		0.05211		-0.92279	-0.36028	0.84704
0.70	5.318376	6.54307		0.11119		-2.04880	-1.03383	1.05331
0.80	9.895417	12.26807		0.33487		-4.42472	-2.90250	1.39754
0.90	28.128611	35.77394		1.57858		6.33241	-11.30048	2.15610

Table 5 (*b*) R_y $m = 1$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.063994	0.55616		0.49811	0.13721	0.45954	0.33401	
0.10	1.136739	0.57966		0.42175	0.10342	0.50099	0.37379	
0.20	1.316767	0.63092		0.28898	0.03924	0.60479	0.47643	
0.30	1.564152	0.71270		0.20211	0.01334	0.79384	0.62468	
0.40	1.923312	0.85623		0.15267	0.03963	1.17751	0.84934	
0.50	2.483111	1.10301		0.14883	0.08677	1.99085	1.21218	
0.60	3.441766	1.54323		0.20797	0.15088	3.94953	1.85290	
0.70	5.318376	2.40314		0.38091	0.26071	9.71908	3.14783	
0.80	9.895416	4.44994		0.87974	0.45769	33.14436	6.45020	
0.90	28.128611	12.54232		3.02575	1.00891	233.51566	20.62355	

Table 5 (c) R_z $m = 1$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.075440	-0.35339		0.57757	-0.00208	0.42824	0.31407	
0.10	1.163190	-0.42586		0.56798	-0.12628	0.44066	0.32940	
0.20	1.389937	-0.52877		0.54439	-0.25896	0.48263	0.36458	
0.30	1.725105	-0.64112		0.53295	-0.30092	0.53904	0.40746	
0.40	2.262632	-0.81837		0.56841	-0.32924	0.60215	0.46107	
0.50	3.222430	-1.16066		0.69619	-0.37812	0.66685	0.53033	
0.60	5.204296	-1.97213		1.04773	-0.51735	0.69322	0.62413	
0.70	10.257699	-4.45125		2.19505	-0.99093	0.43318	0.76073	
0.80	28.567875	-15.46337		7.85197	-3.67787	-5.36611	0.98650	
0.90	173.336550	-122.94558		69.35808	-42.03395	-381.13458	1.48232	

Table 5 (d) R_p $m = 2$

a/R	c_0	c_1	c_2	c_3	c_4	c_5	c_6	c_7
0.05	1.075440	-1.74578	1.16040	-0.00471	0.01848			
0.10	1.163179	-1.78005	1.19235	-0.03408	0.05154			
0.20	1.389516	-1.81547	1.13668	-0.10028	0.10249			
0.30	1.721139	-1.88751	1.06986	-0.15523	0.12609			
0.40	2.240860	-2.05507	1.05621	-0.20753	0.13369			
0.50	3.129506	-2.42349	1.14939	-0.28152	0.14307			
0.60	4.845291	-3.27448	1.48852	-0.44035	0.18144			
0.70	8.835710	-5.56737	2.59493	-0.90377	0.31280			
0.80	21.703452	-14.08551	7.52915	-3.20768	1.02350			
0.90	109.897242	-81.91729	55.35575	-29.87593	9.69151			

Table 5 Resistance functions **R** for bubbles with viscosity ratio $\lambda = 0$ in cylindrical tubes. Coefficients c_i as defined in equations (24, 25). Exponent m as defined for functions ψ_3, ψ_4 in (23). Coefficient c_0 is resistance function for sphere at center of tube.

FM 9272 Muldowney & Higdon : A spectral boundary element approach to 3D Stokes flow

N_Q	I_1	I_2	I_3	I_4
5	0.0490159	0.3359909	-0.0104170	0.1924199
10	-0.0057065	-0.0110099	-0.0001488	-0.0041861
15	-0.0010678	-0.0009633	0.0000052	0.0000104
20	-0.0000976	-0.0000909	0.0000013	0.0000013
25	-0.0000015	-0.0000013	0.0000005	0.0000005
30	0.0000018	0.0000018	0.0000002	0.0000002
35	0.0000007	0.0000007	0.0000001	0.0000001
Exact	6.7053931	3.8261673	4.8121183	2.8771174

Table Ed-1

Quadrature test for singular integration on an element employing the quadrature scheme of (17). Each column lists the error in numerical quadrature as a function of number of quadrature points N_Q in each direction. Last row gives exact value of integral. All integrals are of the form (16). Integrals I_1 and I_2 are for a mapped element with parameters $(a, b, c) = (2, 1, 1)$ representing a parallelogram with acute angle $\pi/4$. I_3 and I_4 have parameters $(a, b, c) = (4, 0, 1)$ representing a stretched rectangle. Integrand in I_1 and I_3 has $g = 1$; integrand in I_2 and I_4 has integrand $g(\xi,\eta) = \cos^2\pi\xi$.

N_Q	. I_1	. I_2	. I_3	. I_4
2	0.01915274	-1.71448579	0.02290818	-0.05094375
4	0.00003448	0.25156860	0.00006239	-0.35131408
6	-0.00000036	-0.01511217	-0.00000029	0.20036868
8	0.00000000	0.00027463	0.00000000	-0.01572876
10	0.00000000	0.00000924	0.00000000	-0.00240866
12	0.00000000	-0.00000052	0.00000000	0.00026231
14	0.00000000	0.00000001	0.00000000	0.00001170
16	0.00000000	0.00000000	0.00000000	-0.00000156
18	0.00000000	0.00000000	0.00000000	-0.00000004
20	0.00000000	0.00000000	0.00000000	0.00000001
Exact	10.59668473	8.16284273	19.80697510	17.36932254

Table Ed-2

Quadrature test for one dimensional integrals of the form (18) employing the mapped variables (19). Each column lists the error in numerical quadrature as a function of number of quadrature points N_Q. Last row gives exact value of integral. Integrals I_1 and I_2 are for parameters $h = 10^{-2}$, $\xi_0 = 0$, while I_3 and I_4 have parameters $h = 10^{-4}$, $\xi_0 = 0$. Integrand in I_1 and I_3 has $g = 1$; integrand in I_2 and I_4 has integrand $g(\xi,\eta) = \cos^2\pi\xi$. Exponent in denominator is $m = 1$.

N_Q	. I_1	. I_2	. I_3	. I_4
2	1.0053667	-2.0950275	0.0119967	0.9172093
4	0.0575662	0.4998792	0.0003463	-0.6366983
6	0.0063481	-0.0307907	0.0000058	0.1763744
8	-0.0004866	0.0008225	0.0000001	-0.0255375
10	-0.0005606	-0.0005390	0.0000000	0.0021869
12	-0.0002542	-0.0002159	0.0000000	-0.0001089
14	-0.0000916	-0.0000818	0.0000000	0.0000026
16	-0.0000297	-0.0000267	0.0000000	0.0000000
18	-0.0000089	-0.0000082	0.0000000	0.0000000
20	-0.0000025	-0.0000023	0.0000000	0.0000000
22	-0.0000007	-0.0000006	0.0000000	0.0000000
24	-0.0000002	-0.0000001	0.0000000	0.0000000
Exact	6.6428848	3.7644642	2.3649165	1.2748930

Table Ed-3

Quadrature test for non-singular integration on an element employing a product quadrature scheme based on (19) as described in the text. Each column lists the error in numerical quadrature as a function of number of quadrature points N_Q. Last row gives exact value of integral. All integrals are of the form (22) for a mapped element with parameters (a, b, c) = (2, 1, 1) representing a parallelogram with acute angle $\pi/4$. Integrals I_1 and I_2 have parameters $(\xi_0, \eta_0, f) = (0, 0, 10^{-4})$ representing a point above the element. I_3 and I_4 have parameters $(\xi_0, \eta_0, f) = (1.01, 1.01, 0)$ representing a point in the plane of the element beyond its border. Integrand in I_1 and I_3 has $g = 1$; integrand in I_2 and I_4 has integrand $g(\xi,\eta) = \cos^2\pi\xi$.