Contents of the solution data files

The textfiles `dataset1` to `dataset6` contain the results of the computations of 171 equilibrium solutions. Each solution has an identification number, which can be found below. Two lists belong to each solution: Their names are "daten" and "thetalist", respectively, followed by the identification number.
The first of these lists gives details of input and output, the second contains the computed values of the unknowns of the discretized problem. The latter list can be copied and inserted into the MAPLE code to start a new computation with similar parameters of the mixture and the film material.

List thetalistxxxxxxxx, meaning of the entries:

Entry $1 \dots (r+1)(s+1)$	values of dimensionless displacements θ of the grid points
Entry $(r+1)(s+1)+1$	value of n
Entry $(r+1)(s+1)+2$	value of f
Entry $(r+1)(s+1)+3$	value of p_{O}
Entry $(r+1)(s+1)+4$	value of p_{W}
Entry $(r+1)(s+1)+5$	value of a

List datenxxxxxxxx, meaning of the entries:

tnum	identification number
hh	film thickness
n1i	$(r+1)$, number of gridpoints in the u-direction
n2i	$(s+1)$, number of gridpoints in the v-direction
L_o	oil length of the mixture, L_O
nu	Poisson's ratio, ν
D0	preferred curvature difference, D_0
H0	preferred mean curvature, H_0
a*theta[1]	displacement of the grid point at ($u=0$, $v=0$) in the direction of $\mathbf{m}$
ns*wc	mean bending energy density, $\bar{w}$
a	elementary length, $= e$ with tube3 and tube4, $= e/4$ with tube6, fixed with cylinders and spheres
po	oil pressure, p_O
ac	area of the elementary patch, A_C
voc	oil volume of the cell, V_OC
vwc	water volume of the cell, V_WC
wc	bending energy of the cell, W_C
ns	number n of cells per unit area of the middle surface of the film
f	Lagrangean parameter f, chemical potential
pw	water pressure, p_W
bed_o	$L_\mathrm{O} - l_\mathrm{O}$, measure of the oil excess
bed_w	$L_\mathrm{W} - l_\mathrm{W}$, measure of the water excess
ns*voc	oil length of the structure, l_O
ns*vwc	water length of the structure, l_W
mean1,dev1	mean value and standard deviation of H
mean2,dev2	mean value and standard deviation of D
mean3,dev3	mean value and standard deviation of $(w-\bar{w})\,\mathrm{tr}\,\mathbf{C}$
mean4,dev4	mean value and standard deviation of $(p_\mathrm{O} l_\mathrm{O} + p_\mathrm{W} l_\mathrm{W})\,\mathrm{tr}\,\mathbf{C}$
mean5,dev5	mean value and standard deviation of $\mathbf{M} : \mathbf{C}^2$
mean6,dev6	mean value and standard deviation of $\mathbf{T} : \mathbf{C}$
mean7,dev7	mean value and standard deviation of p_n
mean8,dev8	mean value and standard deviation of $-\mathbf{T} : \mathbf{C} - p_n = \mathbf{q} \cdot \nabla_\mathrm{T}$
mean9,dev9	mean value and standard deviation of w
a1c	$\int_{A_\mathrm{C}} 2H dA$
a2c	$\int_{A_\mathrm{C}} K dA$
evalf(-6/Pi*a2c)	defect, δ

Identification numbers and properties of the solutions

Selection of solutions for the construction of figs. 5 to 11 (16×16 grid points, no volume constraint)

`dataset1` :

$\nu = 0.9$	D_0	H_0	ω	tube6	tube4	tube3
	1.0	-0.1	-0.0635	—	—	31690014
(figs. 12)	1.0	0.0	0.0	61690001	41690001	31690012
	1.0	0.1	0.0635	—	—	31690010
	1.0	0.2	0.1257	61690004	41690003	31690009
	1.0	0.4	0.2422	61690008	41690005	31690007
	1.0	0.6	0.3440	61690012	41690007	31690005
	1.0	0.8	0.4296	61690016	41690010	31690003
	1.0	1.0	0.5	61690020	41690014	31690001
	0.8	1.0	0.5704	61690042	41690016	31690021
	0.6	1.0	0.6560	61690044	41690018	31690022
	0.4	1.0	0.7578	61690046	41690020	31690023
	0.2	1.0	0.8743	61690048	41690022	31690024
	0.1	1.0	0.9365	—	—	31690025
	0.0	1.0	1.0	61690050	41690024	31690026

`dataset2` :

$\nu = 1.0$	$e\,H_0$	tube6	$e\,H_0$	tube4	$e\,H_0$	tube3
	0.0	61612001	0.0	41612001	0.1	31612006
	0.2	61612014	0.25	41612002	0.2	31612004
	0.4	61612002	0.50	41612003	0.4	31612002
	0.6	61612013	0.75	41612004	0.6	31612011
	0.8	61612003	1.00	41612005	0.8	31612013
	1.0	61612012	1.25	41612006	1.0	31612015
	1.2	61612004	1.50	41612007	1.2	31612016
	1.4	61612011	1.75	41612008	1.4	31612017
	1.6	61612005	2.00	41612009	1.6	31612018
	1.8	61612006	2.15	41612011	1.8	31612019
	2.0	61612007	2.25	41612010	2.0	31612020
	2.08	61612010	2.30	41612012	2.2	31612021
					2.4	31612023
					2.45	31612024

Note: The standard deviation of the mean curvature is given as an imaginary number in some of these lists. This results from a rounding error of a number under a square root, which should be zero. The complex number has simply to be replaced by zero. The problem is removed in the actual version of the code.

Selection of solutions for the construction of figs. 13 to 17 (16×16 grid points, oil volume constraint)

`dataset3` :

Case A of table 1 ($\nu = 0.9$, $D_0 = 0.0$, $H_0 = 0.0$)

L_O	tube6	tube4
0.30	61691089	41691089

Case B of table 1 ($\nu = 0.9$, $D_0 = 1.0$, $H_0 = 0.0$, $\omega = 0.0$)

L_O	tube6	L_O	tube4	L_O	tube3
0.65	61691002	0.60	41691002	0.70	31691052
0.55	61691004	0.50	41691005	0.60	31691053
0.45	61691006	0.40	41691007	0.50	31691054
0.35	61691008	0.30	41691009	0.40	31691055
0.25	61691010	0.20	41691011	0.35	31691056
0.15	61691012	0.10	41691013	0.30	31691057
0.10	61691013	0.05	41691015		
0.05	61691015				

`dataset4` :

Case C of table 1 ($\nu = 0.9$, $D_0 = 1.0$, $H_0 = 0.7$, $\omega = 0.388$)

L_{O}	tube6	tube4	tube3
0.30	61691061	41691061	31691061
0.25	61691062	41691062	31691062
0.20	61691063	41691063	31691063
0.17	61691064	41691064	31691064
0.14	61691065	41691065	31691065
0.11	61691066	41691066	31691066
0.08	61691067	41691067	
0.05	61691068	41691068	

`dataset5` :

Case D of table 1 ($\nu = 0.9$, $D_0 = 0.0$, $H_0 = 0.7$, $\omega = 1.0$)

L_O	tube6	tube4	tube3
0.45	61691038		
0.44			31691024
0.42			31691026
0.40	61691039	41691039	
0.38			31691027
0.35	61691040	41691040	31691028
0.30	61691041	41691041	31691029
0.25	61691042	41691042	31691031
0.20	61691043	41691043	31691033
0.17	61691044	41691044	31691034
0.14	61691045	41691045	31691035
0.12			31691036
0.11	61691046	41691046	
0.08	61691047	41691047	
0.05	61691048	41691048	

Case E of table 1 ($\nu = 1.0$, $H_0 = 0.0$)

L_O	tube6	tube4
0.30	61611009	41611009

Case F of table 1 ($\nu = 1.0$, $H_0 > 0.0$)

The data are identical with those of the case without volume constraint, $\nu = 1.0$.

`dataset6` :

Selection of solutions for the construction of figs. 18 (16×16 grid points, $\nu = 0.9$, $D_0 = 1.0$, $H_0 = 0.0$, $\omega = 0.0$, oil and water volume constraint, $L_W/L_O = 1.15$)

L_O	tube4
0.44	41695006
0.36	41695008
0.28	41695011

Solution for the construction of fig. 19a: 61690050, of fig. 19b: 61690021

Solutions for the construction of fig. 20 ($D_0 = 0$, $H_0 = 1$, no volume constraint):

ν	tube6	tube4	tube3
0.90	61690050	41690024	31690026
0.83			31680056
0.80	61680050	41680024	
0.65	61660003	41660024	31660056
0.50	61650003	41650024	31650056
0.3333	61632011	41630024	31630056

Solution for the construction of fig. 21: 61691056.

Tests with rectangular meshes:

mesh		mesh		error of the defect
16×16	61690050	4×71	69990052	no improvement
16×16	31612006	41×7	39912026	remarkable improvement