

ANNEXE 6 : COEFFICIENTS POUR FORMULE A UN TERME (Fo_r supérieur à 0.2)

(Version du 13 mars 2022 (16h20))

{Réf. 7 et 2}

Pour rappel, les formules simplifiées du **Chapitre 4 § 4.3**. “Coefficient de transfert imposé en surface (Condition de Newton - Fourier) sont :

$$\Theta = \frac{T_{(z,t)} - T_{\infty}}{T_0 - T_{\infty}} \left\langle \text{ou } \frac{T_{(r,t)} - T_{\infty}}{T_0 - T_{\infty}} \right\rangle \approx A_1 f_1 \exp\left(-\hat{\lambda}_1^2 Fo_r\right)$$

$$Q/Q_0 \approx 1 - D_1 \exp\left(-\hat{\lambda}_1^2 Fo_r\right)$$

<i>Bi_r</i>	<i>Plaque</i>			<i>Cylindre</i>			<i>Sphère</i>		
	$\hat{\lambda}_1$	<i>A</i> ₁	<i>D</i> ₁	$\hat{\lambda}_1$	<i>A</i> ₁	<i>D</i> ₁	$\hat{\lambda}_1$	<i>A</i> ₁	<i>D</i> ₁
0.000	0.00000	1.0000	1.0000	0.00000	1.0000	1.0000	0.00000	1.0000	1.0000
0.001	0.03162	1.0002	1.0000	0.04472	1.0003	1.0000	0.05577	1.0003	1.0000
0.002	0.04471	1.0003	1.0000	0.06323	1.0005	1.0000	0.07744	1.0006	1.0000
0.004	0.06320	1.0007	1.0000	0.08940	1.0010	1.0000	0.10950	1.0012	1.0000
0.006	0.07738	1.0010	1.0000	0.10946	1.0015	1.0000	0.13408	1.0018	1.0000
0.008	0.08932	1.0013	1.0000	0.12637	1.0020	1.0000	0.15480	1.0024	1.0000
0.01	0.09983	1.0017	1.0000	0.14124	0.14124	1.0025	0.17303	1.0030	1.0000
0.02	0.14095	1.0033	1.0000	0.19950	0.19950	1.0050	0.24446	1.0060	1.0000
0.04	0.19868	1.0066	1.0000	0.28144	0.28143	1.0099	0.34503	1.0120	1.0000
0.05	0.22176	1.0082	0.9999	0.31426	0.31426	1.0124	0.38537	1.0150	1.0000
0.06	0.24253	1.0098	0.9999	0.34383	0.34383	1.0148	0.42173	1.0179	0.9999
0.08	0.27913	1.0130	0.9999	0.39603	0.39603	1.0197	0.48600	1.0239	0.9999
0.10	0.31105	1.0161	0.9998	0.44168	1.0246	0.9998	0.54228	1.0298	0.9998
0.12	0.33963	1.0192	0.9997	0.48264	1.0294	0.9997	0.59286	1.0357	0.9998
0.14	0.36566	1.0222	0.9996	0.52003	1.0342	0.9996	0.63908	1.0416	0.9997
0.15	0.37788	1.0237	0.9995	0.53761	1.0365	0.9995	0.66086	1.0445	0.9996
0.16	0.38964	1.0252	0.9995	0.55456	1.0389	0.9995	0.68185	1.0475	0.9996
0.18	0.41195	1.0282	0.9993	0.58675	1.0436	0.9994	0.72178	1.0533	0.9995
0.20	0.43284	1.0311	0.9992	0.61697	1.0483	0.9992	0.75931	1.0592	0.9993
0.22	0.45252	1.0340	0.9990	0.64550	1.0529	0.9990	0.79479	1.0650	0.9992
0.24	0.47114	1.0368	0.9989	0.67256	1.0576	0.9989	0.82849	1.0708	0.9990
0.26	0.48883	1.0396	0.9987	0.69831	1.0621	0.9987	0.86061	1.0765	0.9989
0.28	0.50568	1.0423	0.9985	0.72291	1.0667	0.9985	0.89133	1.0823	0.9987
0.30	0.52179	1.0450	0.9983	0.74646	1.0712	0.9983	0.92079	1.0880	0.9985
0.35	0.55922	1.0517	0.9977	0.80140	1.0823	0.9977	0.98966	1.1023	0.9980
0.40	0.59324	1.0580	0.9971	0.85158	1.0931	0.9970	1.05279	1.1164	0.9974
0.45	0.62445	1.0642	0.9964	0.89783	1.1038	0.9963	1.11118	1.1303	0.9968
0.50	0.65327	1.0701	0.9956	0.94077	1.1143	0.9954	1.16556	1.1441	0.9960
0.55	0.68006	1.0759	0.9948	0.98085	1.1245	0.9946	1.21649	1.1578	0.9952
0.60	0.70507	1.0814	0.9940	1.01844	1.1345	0.9936	1.26440	1.1713	0.9944
0.70	0.75056	1.0918	0.9922	1.08725	1.1539	0.9916	1.35252	1.1978	0.9925
0.80	0.79103	1.1016	0.9903	1.14897	1.1724	0.9893	1.43203	1.2236	0.9904
0.90	0.82740	1.1107	0.9882	1.20484	1.1902	0.9869	1.50442	1.2488	0.9880

Bi_r	Plaque			Cylindre			Sphère		
	$\hat{\lambda}_1$	A_1	D_1	$\hat{\lambda}_1$	A_1	D_1	$\hat{\lambda}_1$	A_1	D_1
1.00	0.86033	1.1191	0.9861	1.25578	1.2071	0.9843	1.57080	1.2732	0.9855
1.10	0.89035	1.1270	0.9839	1.30251	1.2232	0.9815	1.63199	1.2970	0.9828
1.20	0.91785	1.1344	0.9817	1.34558	1.2387	0.9787	1.68868	1.3201	0.9800
1.30	0.94316	1.1412	0.9794	1.38543	1.2533	0.9757	1.74140	1.3424	0.9770
1.40	0.96655	1.1477	0.9771	1.42246	1.2673	0.9727	1.79058	1.3640	0.9739
1.50	0.98824	1.1537	0.9748	1.45695	1.2807	0.9696	1.83660	1.3850	0.9707
1.60	1.00842	1.1593	0.9726	1.48917	1.2934	0.9665	1.87976	1.4052	0.9674
1.80	1.04486	1.1695	0.9680	1.54769	1.3170	0.9601	1.95857	1.4436	0.9605
2.00	1.07687	1.1785	0.9635	1.59945	1.3384	0.9537	2.02876	1.4793	0.9534
2.20	1.10524	1.1864	0.9592	1.64557	1.3578	0.9472	2.09166	1.5125	0.9462
2.40	1.13056	1.1934	0.9549	1.68691	1.3754	0.9408	2.14834	1.5433	0.9389
2.60	1.15330	1.1997	0.9509	1.7234	1.3910	0.9347	2.19967	1.5718	0.9316
2.80	1.17383	1.2052	0.9469	1.7578	1.4058	0.9284	2.24633	1.5982	0.9243
3.00	1.19246	1.2102	0.9431	1.78866	1.4191	0.9224	2.28893	1.6227	0.9171
3.50	1.23227	1.2206	0.9343	1.8547	1.4473	0.9081	2.38064	1.6761	0.8995
4.00	1.26459	1.2287	0.9264	1.90808	1.4698	0.8950	2.45564	1.7202	0.8830
4.50	1.29134	1.2351	0.9193	1.9519	1.4878	0.8832	2.51796	1.7567	0.8675
5.00	1.31384	1.2402	0.9130	1.98981	1.5029	0.8721	2.57043	1.7870	0.8533
5.50	1.33302	1.2444	0.9073	2.0224	1.5154	0.8620	2.61515	1.8124	0.8401
6.00	1.34955	1.2479	0.9021	2.04901	1.5253	0.8532	2.65366	1.8338	0.8281
7.00	1.37662	1.2532	0.8932	2.0937	1.5411	0.8376	2.71646	1.8673	0.8069
8.00	1.39782	1.2570	0.8858	2.12864	1.5526	0.8244	2.76536	1.8920	0.7889
9.00	1.41487	1.2598	0.8796	2.1566	1.5611	0.8133	2.80443	1.9106	0.7737
10.00	1.42887	1.2620	0.8743	2.17950	1.5677	0.8039	2.83630	1.9249	0.7607
12.00	1.45051	1.2650	0.8658	2.2181	1.5777	0.7871	2.88509	1.9450	0.7397
14.00	1.46643	1.2669	0.8592	2.2428	1.5833	0.7759	2.92060	1.9581	0.7236
15.00	1.47292	1.2676	0.8565				2.93495	1.9630	0.7169
16.00	1.47864	1.2683	0.8541	2.2627	1.5874	0.7665	2.94756	1.9670	0.7109
18.00	1.48830	1.2692	0.8499	2.2760	1.5899	0.7601	2.96871	1.9734	0.7007
20.00	1.49613	1.2699	0.8464	2.28805	1.5919	0.7542	2.98572	1.9781	0.6922
25.00	1.51045	1.2710	0.8400	2.3108	1.5954	0.7427	3.01656	1.9856	0.6766
30.00	1.52017	1.2717	0.8355	2.3261	1.5973	0.7348	3.03724	1.9898	0.6658
35.00	1.52719	1.2721	0.8322	2.3366	1.5984	0.7293	3.05207	1.9924	0.6579
40.00	1.53250	1.2723	0.8296	2.3455	1.5993	0.7246	3.06321	1.9942	0.6519
50.00	1.54001	1.2727	0.8260	2.35724	1.6002	0.7183	3.07884	1.9962	0.6434
60.00	1.54505	1.2728	0.8235	2.3651	1.6007	0.7140	3.08928	1.9974	0.6376
70.00	1.54868	1.2729	0.8217	2.3707	1.6011	0.7109	3.09674	1.9980	0.6335
80.00	1.55141	1.2730	0.8204	2.3750	1.6013	0.7085	3.10234	1.9985	0.6303
90.00	1.55354	1.2731	0.8193	2.3791	1.6015	0.7062	3.10670	1.9988	0.6279
100.00	1.55525	1.2731	0.8185	2.38090	1.6015	0.7052	3.11019	1.9990	0.6259
∞	1.57080	1.2732	0.8106	2.40483	1.6020	0.6917	3.14159	2.0000	0.6079

Tableau A6.1. – Coefficient de transfert imposé en surface (Condition de Newton - Fourier).