TABLE A

TO BE LODGED WITH THE EDITOR

Table A.

The critical value of $T$ and the corresponding values of $a$, $\sigma_r$ and $c$ for assigned values of $\mu$ and $k$.

| $\mu$ | $k$ | $a$ | $T_c(\mu,k)$ | $\sigma_r$ | $c$ | $T_c(\mu,k)/T_c(\mu,0)$ |
|---|---|---|---|---|---|---|
| 1.00 | | 3.116 | 1707.9 | | | 1.0000 |
| 0.50 | 0. | 3.118 | 2275.2 | 0. | 0. | 1.0000 |
| | 0.15811 | 3.118 | 2276.7 | -5.6913 | 0.7544 | 1.0006 |
| | 0.31623 | 3.120 | 2281.1 | -11.394 | 0.7544 | 1.0026 |
| | 0.47434 | 3.124 | 2288.4 | -17.119 | 0.7544 | 1.0058 |
| | 0.63246 | 3.128 | 2298.7 | -22.877 | 0.7544 | 1.0103 |
| | 0.79057 | 3.134 | 2312.2 | -28.681 | 0.7545 | 1.0162 |
| 0. | 0. | 3.127 | 3390.1 | 0. | 0. | 1.0000 |
| | 0.15811 | 3.131 | 3402.5 | -4.8534 | 0.5262 | 1.0037 |
| | 0.31623 | 3.143 | 3440.3 | -9.7661 | 0.5265 | 1.0148 |
| | 0.47434 | 3.163 | 3504.8 | -14.799 | 0.5270 | 1.0338 |
| | 0.63246 | 3.190 | 3598.6 | -20.020 | 0.5277 | 1.0615 |
| | 0.79057 | 3.225 | 3725.6 | -25.505 | 0.5285 | 1.0990 |
| -0.50 | 0. | 3.199 | 6414.3 | 0. | 0. | 1.0000 |
| | 0.15811 | 3.215 | 6483.8 | -4.5963 | 0.3610 | 1.0108 |
| | 0.31623 | 3.262 | 6695.3 | -9.4126 | 0.3638 | 1.0438 |
| | 0.47434 | 3.334 | 7059.6 | -14.668 | 0.3680 | 1.1006 |
| | 0.63246 | 3.425 | 7599.7 | -20.592 | 0.3735 | 1.1848 |
| | 0.79057 | 3.528 | 8362.0 | -27.467 | 0.3799 | 1.3036 |

TO BE LODGED WITH THE EDITOR

Table 1

(Continued)

| $\mu$ | k | a | $T_c(\mu,k)$ | $\sigma_r$ | c | $T_c(\mu,k)/T_c(\mu,0)$ |
|---|---|---|---|---|---|---|
| -0.75 | 0. | 3.406 | 10519 | 0. | 0. | 1.0000 |
| | 0.15811 | 3.417 | 10560 | -5.8138 | 0.3578 | 1.0039 |
| | 0.31623 | 3.451 | 10726 | -11.612 | 0.3546 | 1.0196 |
| | 0.47434 | 3.514 | 11114 | -17.575 | 0.3515 | 1.0565 |
| | 0.63246 | 3.605 | 11846 | -24.090 | 0.3500 | 1.1261 |
| | 0.79057 | 3.730 | 13099 | -31.780 | 0.3512 | 1.2453 |
| | 0.90000 | 3.842 | 14434 | -38.331 | 0.3545 | 1.3721 |
| -0.80 | 0. | 3.493 | 11795 | 0. | 0. | 1.0000 |
| | 0.15811 | 3.489 | 11783 | -6.3041 | 0.3673 | 0.9989 |
| | 0.31623 | 3.499 | 11840 | -12.376 | 0.3597 | 1.0038 |
| | 0.47434 | 3.547 | 12152 | -18.418 | 0.3522 | 1.0302 |
| | 0.63246 | 3.636 | 12888 | -24.954 | 0.3475 | 1.0926 |
| | 0.79057 | 3.769 | 14267 | -32.763 | 0.3470 | 1.2095 |
| | 1.00000 | 4.041 | 17806 | -47.456 | 0.3556 | 1.5096 |
| -0.90 | 0. | 3.723 | 14900 | 0. | 0. | 1.0000 |
| | 0.03953 | 3.719 | 14887 | -1.9219 | 0.3985 | 0.9991 |
| | 0.15811 | 3.668 | 14713 | -7.5059 | 0.3914 | 0.9874 |
| | 0.31623 | 3.595 | 14410 | -14.170 | 0.3733 | 0.9671 |
| | 0.39528 | 3.588 | 14369 | -17.235 | 0.3637 | 0.9644 |
| | 0.47434 | 3.603 | 14464 | -20.272 | 0.3554 | 0.9707 |
| | 0.63246 | 3.693 | 15186 | -26.774 | 0.3435 | 1.0192 |
| | 0.79057 | 3.851 | 16873 | -34.842 | 0.3393 | 1.1324 |

TO BE LODGED WITH THE EDITOR

Table 1

(Continued)

| $\mu$ | k | a | $T_c(\mu,k)$ | $\sigma_r$ | c | $T_c(\mu,k)/T_c(\mu,0)$ |
|---|---|---|---|---|---|---|
| -1.00 | 0. | 3.999 | 18669 | 0. | 0. | 1.0000 |
| | 0.11180 | 3.941 | 18478 | -6.3375 | 0.4170 | 0.9898 |
| | 0.15811 | 3.888 | 18296 | -8.8326 | 0.4130 | 0.9800 |
| | 0.22361 | 3.799 | 17970 | -12.127 | 0.4046 | 0.9626 |
| | 0.31623 | 3.690 | 17489 | -16.235 | 0.3882 | 0.9368 |
| | 0.33541 | 3.675 | 17404 | -17.013 | 0.3845 | 0.9323 |
| | 0.44721 | 3.642 | 17129 | -21.297 | 0.3639 | 0.9175 |
| | 0.47434 | 3.647 | 17132 | -22.316 | 0.3594 | 0.9176 |
| | 0.55901 | 3.686 | 17345 | -25.600 | 0.3477 | 0.9291 |
| | 0.63246 | 3.745 | 17810 | -28.716 | 0.3402 | 0.9540 |
| | 0.79057 | 3.940 | 19900 | -37.115 | 0.3328 | 1.0659 |
| -1.25 | 0. | 4.612 | 30426 | 0. | 0. | 1.0000 |
| | 0.15811 | 4.510 | 30003 | -11.628 | 0.4246 | 0.9861 |
| | 0.31623 | 4.039 | 28239 | -22.088 | 0.4156 | 0.9281 |
| | 0.42164 | 3.730 | 26444 | -26.555 | 0.3873 | 0.8691 |
| | 0.47434 | 3.711 | 25868 | -28.280 | 0.3707 | 0.8502 |
| | 0.52704 | 3.741 | 25625 | -30.043 | 0.3561 | 0.8422 |
| | 0.63246 | 3.878 | 26165 | -34.236 | 0.3346 | 0.8600 |
| | 0.79057 | 4.205 | 29728 | -43.855 | 0.3217 | 0.9771 |

TABLE B

TO BE LODGED WITH THE EDITOR

The critical Reynolds number based on the speed of the inner cylinder for assigned values of $\mu$ and m ( $\delta$ = 1/20). The minimum is enclosed in parentheses.

~~Table 2~~

$$R = \Omega_1 R_1 \, d/\nu$$

| $\mu$ | m = 0 | m = 1 | m = 2 | m = 3 | m = 4 | m = 5 | m = 6 |
|---|---|---|---|---|---|---|---|
| 1.00 | $\rightarrow 130.6(1-\mu)^{-\frac{1}{2}}$ | | | | | | |
| 0.50 | (213.3) | 213.4 | 213.8 | 214.6 | | | |
| 0.00 | (184.1) | 184.4 | 185.5 | 187.2 | 189.7 | 193.0 | |
| -0.50 | (206.8) | 207.5 | 209.7 | 213.5 | 218.4 | 224.3 | 234.1 |
| -0.75 | (245.1) | 245.4 | 246.32 | 248.3 | 252.1 | 257.8 | 266.9 |
| -0.80 | 256.0 | (255.8) | 256.0 | 256.8 | 259.7 | 264.9 | 272.7 |
| -0.90 | 280.0 | 279.2 | 276.6 | (275.1) | 275.6 | 279.3 | 286.5 |
| -1.00 | 305.5 | 303.7 | 300.3 | 295.0 | (292.6) | 294.5 | 300.8 |
| -1.25 | 367.7 | 366.5 | 363.0 | 354.3 | 342.8 | (337.5) | 341.0 |

TABLE C

TO BE LODGED WITH THE EDITOR

The critical value of $T$ and the corresponding values of $a$, $\sigma_r$ and $c$ for assigned values of $\mu$, $\eta$ and $m$.

Table 2. ~~(used in constructing figures 4 and 5)~~

| $\eta$ | $\mu$ | m | a | $T_c$ | $-\sigma_r$ | c | $T/T(m=0)$ |
|---|---|---|---|---|---|---|---|
| 0.95 | 0 | 0 | 3.128 | 3509.9 | 0 | 0 | 1.0000 |
| | | 1 | 3.130 | 3525.5 | 5.0002 | 0.5127 | 1.0044 |
| | | 2 | 3.146 | 3571.8 | 10.072 | 0.5130 | 1.0176 |
| | | 3 | 3.169 | 3652.0 | 15.291 | 0.5135 | 1.0405 |
| | | 4 | 3.201 | 3769.2 | 20.740 | 0.5142 | 1.0739 |
| 0.95 | -0.80 | 0 | 3.620 | 13919 | 0 | 0 | 1.0000 |
| | | 1 | 3.602 | 13859 | 5.3259 | 0.3781 | 0.9957 |
| | | 2 | 3.570 | 13748 | 10.368 | 0.3695 | 0.9877 |
| | | 3 | 3.561 | 13731 | 15.106 | 0.3591 | 0.9865 |
| | | 4 | 3.588 | 13942 | 19.769 | 0.3498 | 1.0017 |
| 0.95 | -1.00 | 0 | 4.199 | 22388 | 0 | 0 | 1.0000 |
| | | 1 | 4.135 | 22165 | 7.0645 | 0.4192 | 0.9900 |
| | | 2 | 3.949 | 21502 | 13.593 | 0.4095 | 0.9604 |
| | | 3 | 3.748 | 20622 | 18.961 | 0.3889 | 0.9211 |
| | | 4 | 3.680 | 20072 | 23.358 | 0.3641 | 0.8966 |
| | | 5 | 3.726 | 20222 | 27.710 | 0.3443 | 0.9032 |
| | | 6 | 3.842 | 21226 | 32.812 | 0.3316 | 0.9481 |
| 0.95 | -1.25 | 0 | 4.802 | 36627 | 0 | 0 | 1.0000 |
| | | 1 | 4.771 | 36477 | 8.4444 | 0.4155 | 0.9959 |
| | | 2 | 4.648 | 35927 | 16.740 | 0.4150 | 0.9809 |
| | | 3 | 4.298 | 34571 | 24.487 | 0.4125 | 0.9439 |
| | | 4 | 3.780 | 32078 | 29.741 | 0.3901 | 0.8758 |
| | | 5 | 3.774 | 30632 | 33.102 | 0.3555 | 0.8363 |
| | | 6 | 3.942 | 31163 | 37.367 | 0.3315 | 0.8508 |

TO BE LODGED WITH THE EDITOR

Table 2

(Continued)

| $\nu$ | $\mu$ | m | a | $T_c$ | $-\sigma_r$ | c | T/T(m=0) |
|---|---|---|---|---|---|---|---|
| 0.95 | -1.50 | 0 | 5.321 | 56244 | 0 | 0 | 1.0000 |
| | | 1 | 5.298 | 56069 | 9.7642 | 0.4094 | 0.9969 |
| | | 2 | 5.235 | 55581 | 19.328 | 0.4070 | 0.9882 |
| | | 3 | 5.107 | 54733 | 28.606 | 0.4046 | 0.9731 |
| | | 4 | 4.574 | 52570 | 37.489 | 0.4058 | 0.9347 |
| | | 5 | 3.729 | 46773 | 40.627 | 0.3730 | 0.8316 |
| | | 6 | 4.002 | 45308 | 43.616 | 0.3391 | 0.8056 |
| | | 7 | 4.328 | 47714 | 49.190 | 0.3194 | 0.8483 |
| 0.95 | -1.75 | 0 | 5.864 | 83178 | 0 | 0 | 1.0000 |
| | | 1 | 5.832 | 82870 | 11.349 | 0.4112 | 0.9963 |
| | | 2 | 5.744 | 82001 | 22.366 | 0.4074 | 0.9858 |
| | | 3 | 5.646 | 80851 | 32.808 | 0.4012 | 0.9720 |
| | | 4 | 5.537 | 79663 | 42.846 | 0.3959 | 0.9577 |
| | | 5 | 3.453 | 72308 | 49.982 | 0.3878 | 0.8693 |
| | | 6 | 3.986 | 65412 | 51.538 | 0.3504 | 0.7864 |
| | | 7 | 4.430 | 66438 | 56.019 | 0.3239 | 0.7987 |
| 0.95 | -2.00 | 0 | 6.417 | 118869 | 0 | 0 | 1.0000 |
| | | 5 | 3.098 | 111331 | 60.133 | 0.3933 | 0.9366 |
| | | 6 | 3.871 | 93941 | 60.924 | 0.3615 | 0.7903 |
| | | 7 | 4.483 | 91298 | 64.147 | 0.3310 | 0.7681 |
| | | 8 | 5.006 | 98009 | 71.753 | 0.3126 | 0.8245 |
| 0.95 | -1.00 | 0 | 4.199 | 22388 | 0 | 0 | 1.0000 |
| | | 1 | 4.135 | 22165 | 7.0645 | 0.4192 | 1.0000 |
| | | 2 | 3.949 | 21502 | 13.593 | 0.4095 | 0.9604 |
| | | 3 | 3.748 | 20622 | 18.961 | 0.3889 | 0.9211 |
| | | 4 | 3.680 | 20072 | 23.358 | 0.3641 | 0.8966 |
| | | 5 | 3.726 | 20222 | 27.710 | 0.3443 | 0.9032 |
| | | 6 | 3.842 | 21226 | 32.812 | 0.3316 | 0.9481 |

TO BE LODGED WITH THE EDITOR

Table 2

(Continued)

| $\eta$ | $\mu$ | m | a | $T_c$ | $-\sigma_r$ | c | T/T(m=0) |
|---|---|---|---|---|---|---|---|
| 0.90 | -1.00 | 0 | 4.410 | 27148 | 0 | 0 | 1.0000 |
| | | 1 | 4.286 | 26687 | 10.950 | 0.4138 | 0.9830 |
| | | 2 | 3.896 | 25172 | 20.388 | 0.3966 | 0.9272 |
| | | 3 | 3.721 | 23862 | 26.896 | 0.3583 | 0.8789 |
| | | 4 | 3.854 | 24631 | 33.585 | 0.3302 | 0.9073 |
| | | 5 | 4.138 | 28185 | 43.523 | 0.3201 | 1.0382 |
| 0.85 | -1.00 | 0 | 4.627 | 33345 | 0 | 0 | 1.0000 |
| | | 1 | 4.469 | 32702 | 14.709 | 0.4053 | 0.9807 |
| | | 2 | 3.851 | 30063 | 26.617 | 0.3825 | 0.9016 |
| | | 3 | 3.847 | 29130 | 34.330 | 0.3341 | 0.8736 |
| | | 4 | 4.225 | 33761 | 46.369 | 0.3144 | 1.0125 |
| | | 5 | 4.845 | 46501 | 70.741 | 0.3269 | 1.3946 |
| 0.80 | -1.00 | 0 | 4.858 | 41626 | 0 | 0 | 1.0000 |
| | | 1 | 4.694 | 40894 | 18.708 | 0.3949 | 0.9824 |
| | | 2 | 3.835 | 36767 | 33.009 | 0.3674 | 0.8833 |
| | | 3 | 4.089 | 37660 | 43.139 | 0.3163 | 0.9047 |
| | | 4 | 4.784 | 51155 | 66.425 | 0.3134 | 1.2289 |
| | | 5 | 5.801 | 83342 | 119.074 | 0.3521 | 2.0022 |
| 0.75 | -1.00 | 0 | 5.115 | 53051 | 0 | 0 | 1.0000 |
| | | 1 | 4.963 | 52275 | 23.230 | 0.3840 | 0.9854 |
| | | 2 | 3.873 | 46243 | 40.086 | 0.3523 | 0.8717 |
| | | 3 | 4.449 | 51727 | 55.003 | 0.3047 | 0.9750 |
| | | 4 | 5.534 | 83476 | 99.032 | 0.3239 | 1.5735 |
| 0.70 | -1.00 | 0 | 5.420 | 69359 | 0 | 0 | 1.0000 |
| | | 1 | 5.269 | 68419 | 28.600 | 0.3738 | 0.9864 |
| | | 2 | 3.984 | 60099 | 48.472 | 0.3380 | 0.8665 |
| | | 3 | 4.935 | 75518 | 72.031 | 0.2987 | 1.0888 |
| | | 4 | 6.493 | 142333 | 150.541 | 0.3410 | 2.0521 |

TO BE LODGED WITH THE EDITOR

Table 2

(Continued)

| $\eta$ | $\mu$ | m | a | $T_c$ | $-\sigma_r$ | c | T/T(m=0) |
|---|---|---|---|---|---|---|---|
| 0.65 | -1.00 | 0 | 5.797 | 93396 | 0 | 0 | 1.0000 |
| | | 1 | 5.610 | 91949 | 35.241 | 0.3648 | 0.9845 |
| | | 2 | 4.177 | 81079 | 58.974 | 0.3251 | 0.8681 |
| | | 3 | 5.571 | 116952 | 97.302 | 0.2977 | 1.2522 |
| 0.60 | -1.00 | 0 | 6.259 | 129960 | 0 | 0 | 1.0000 |
| | | 1 | 5.995 | 127515 | 43.760 | 0.3573 | 0.9812 |
| | | 2 | 4.456 | 114044 | 72.626 | 0.3135 | 0.8775 |
| | | 3 | 6.410 | 191183 | 135.567 | 0.3013 | 1.4711 |

TABLE D

TO BE LODGED WITH THE EDITOR

The critical value of T and the corresponding values of a and c for assigned values of m for $\mu = 0$ and $\mu = -1$ according to wide-gap theory and small-gap theory for $\eta = 0.95$. (Used in constructing figures 4 and 5)

~~Table 2~~

| | | Wide-gap, $\eta = 0.95$ | | | Small-gap approximation, $\eta = 0.95$ | | |
|---|---|---|---|---|---|---|---|
| $\mu$ | m | a | T | c | a | T | c |
| 0.0 | 0 | 3.128 | 3509.9 | | 3.127 | 3390.1 | |
| | 1 | 3.130 | 3525.0 | 0.5127 | 3.131 | 3403.2 | 0.5262 |
| | 2 | 3.146 | 3571.8 | 0.5130 | 3.144 | 3443.0 | 0.5265 |
| | 3 | 3.169 | 3652.0 | 0.5135 | 3.165 | 3511.0 | 0.5270 |
| | 4 | 3.194 | 3769.2 | 0.5142 | 3.190 | 3610.0 | 0.5277 |
| -1.0 | 0 | 4.199 | 22388 | | 3.999 | 18669 | |
| | 1 | 4.135 | 22164 | 0.4192 | 3.938 | 18469 | 0.4168 |
| | 2 | 3.949 | 21502 | 0.4095 | 3.791 | 17939 | 0.4036 |
| | 3 | 3.748 | 20621 | 0.3888 | 3.669 | 17368 | 0.3828 |
| | 4 | 3.680 | 20072 | 0.3641 | 3.644 | 17130 | 0.3620 |
| | 5 | 3.726 | 20221 | 0.3443 | 3.696 | 17416 | 0.3460 |
| | 6 | 3.842 | 21225 | 0.3316 | 3.804 | 18360 | 0.3363 |