**PROPELLER IN OPEN WATER – APPLICATIONS**

**1-**



|  |  |
| --- | --- |
| Pd(kW) | 10000 |
| N(rpm) | 150 |
| VA(m/s) | 10 |
| D(m) | ? |
| P/D | ? |
| T (kN) | ? |

Open water data of Propeller B 4.50





**Solution:** The problem suits for the Case 3 which is “**Optimum propeller for given power and rate”** since engine power and rotation rate have been given.

The parameterr given in the problem are to be used in this case is KQ/J5 since in this parameter the ***power and the rotation rate are present*** and the ***diameter is eliminated***.



Each column of table given above is scanned by calculating Eta0 and value of KQ/J5 with Kt and Kq values. Then, an interpolation is performed for each column for data given in the problem as “0.097”. The performance data are obtained as shown righy side of each column data.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **0.9** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kq/J^5** | **0.097** |  |  |  |  |
| 0.0 | 0.3840 | 0.4956 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.3567 | 0.4681 | 0.1213 | 4681.0000 |  |  |  |  |  |
| 0.2 | 0.3263 | 0.4362 | 0.2381 | 136.3125 |  |  |  |  |  |
| 0.3 | 0.2929 | 0.3999 | 0.3497 | 16.4568 |  |  |  |  |  |
| 0.4 | 0.2564 | 0.3593 | 0.4543 | 3.5088 |  |  |  |  |  |
| 0.5 | 0.2169 | 0.3143 | 0.5492 | 1.0058 |  |  |  |  |  |
| 0.6 | 0.1743 | 0.2649 | 0.6283 | 0.3407 |  | eta0 | J | Kt | 10Kq |
| 0.7 | 0.1287 | 0.2112 | 0.6789 | 0.1257 | 1 | 0.676851 | 0.736058 | 0.11114 | 0.189601 |
| 0.8 | 0.0800 | 0.1513 | 0.6732 | 0.0462 | 0 |  |  |  |  |
| 0.9 | 0.0283 | 0.0906 | 0.4474 | 0.0153 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **1** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kq/J^5** |  |  |  |  |  |
| 0.0 | 0.4250 | 0.5994 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.3984 | 0.5698 | 0.1113 | 5698.0000 |  |  |  |  |  |
| 0.2 | 0.3689 | 0.5357 | 0.2192 | 167.4063 |  |  |  |  |  |
| 0.3 | 0.3365 | 0.4971 | 0.3232 | 20.4568 |  |  |  |  |  |
| 0.4 | 0.3013 | 0.4540 | 0.4225 | 4.4336 |  |  |  |  |  |
| 0.5 | 0.2631 | 0.4064 | 0.5152 | 1.3005 |  |  |  |  |  |
| 0.6 | 0.2221 | 0.3543 | 0.5986 | 0.4556 |  | eta0 | J | Kt | 10Kq |
| 0.7 | 0.1782 | 0.2976 | 0.6671 | 0.1771 | 1 | 0.697874 | 0.776333 | 0.142476 | 0.250961 |
| 0.8 | 0.1314 | 0.2365 | 0.7074 | 0.0722 | 0 |  |  |  |  |
| 0.9 | 0.0818 | 0.1708 | 0.6860 | 0.0289 |  |  |  |  |  |
| 1.0 | 0.0292 | 0.1007 | 0.4615 | 0.0101 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **1.1** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kq/J^5** |  |  |  |  |  |
| 0.0 | 0.4644 | 0.7133 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.4391 | 0.6818 | 0.1025 | 6818.0000 |  |  |  |  |  |
| 0.2 | 0.4109 | 0.6456 | 0.2026 | 201.7500 |  |  |  |  |  |
| 0.3 | 0.3799 | 0.6048 | 0.2999 | 24.8889 |  |  |  |  |  |
| 0.4 | 0.3461 | 0.5594 | 0.3939 | 5.4629 |  |  |  |  |  |
| 0.5 | 0.3095 | 0.5094 | 0.4835 | 1.6301 |  |  |  |  |  |
| 0.6 | 0.2701 | 0.4548 | 0.5671 | 0.5849 |  |  |  |  |  |
| 0.7 | 0.2278 | 0.3955 | 0.6417 | 0.2353 |  | eta0 | J | Kt | 10Kq |
| 0.8 | 0.1827 | 0.3317 | 0.7013 | 0.1012 | 1 | 0.70371 | 0.807461 | 0.179126 | 0.326589 |
| 0.9 | 0.1348 | 0.2632 | 0.7336 | 0.0446 | 0 |  |  |  |  |
| 1.0 | 0.0841 | 0.1900 | 0.7045 | 0.0190 |  |  |  |  |  |
| 1.1 | 0.0305 | 0.1123 | 0.4755 | 0.0070 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **1.2** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kq/J^5** |  |  |  |  |  |
| 0.0 | 0.5022 | 0.8374 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.4787 | 0.8040 | 0.0948 | 8040.0000 |  |  |  |  |  |
| 0.2 | 0.4523 | 0.7659 | 0.1880 | 239.3438 |  |  |  |  |  |
| 0.3 | 0.4231 | 0.7231 | 0.2794 | 29.7572 |  |  |  |  |  |
| 0.4 | 0.3910 | 0.6757 | 0.3684 | 6.5986 |  |  |  |  |  |
| 0.5 | 0.3560 | 0.6234 | 0.4544 | 1.9949 |  |  |  |  |  |
| 0.6 | 0.3181 | 0.5665 | 0.5362 | 0.7285 |  |  |  |  |  |
| 0.7 | 0.2774 | 0.5049 | 0.6121 | 0.3004 |  | eta0 | J | Kt | 10Kq |
| 0.8 | 0.2338 | 0.4385 | 0.6789 | 0.1338 | 1 | 0.705386 | 0.851436 | 0.209934 | 0.40198 |
| 0.9 | 0.1874 | 0.3675 | 0.7304 | 0.0622 | 0 |  |  |  |  |
| 1.0 | 0.1381 | 0.2917 | 0.7535 | 0.0292 |  |  |  |  |  |
| 1.1 | 0.0859 | 0.2113 | 0.7117 | 0.0131 |  |  |  |  |  |
| 1.2 | 0.0308 | 0.1261 | 0.4665 | 0.0051 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **1.3** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kq/J^5** |  |  |  |  |  |
| 0.0 | 0.5384 | 0.9717 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.5173 | 0.9366 | 0.0879 | 9366.0000 |  |  |  |  |  |
| 0.2 | 0.4931 | 0.8967 | 0.1750 | 280.2188 |  |  |  |  |  |
| 0.3 | 0.4959 | 0.8520 | 0.2779 | 35.0617 |  |  |  |  |  |
| 0.4 | 0.4358 | 0.8026 | 0.3457 | 7.8379 |  |  |  |  |  |
| 0.5 | 0.4026 | 0.7484 | 0.4281 | 2.3949 |  |  |  |  |  |
| 0.6 | 0.3663 | 0.6894 | 0.5074 | 0.8866 |  |  |  |  |  |
| 0.7 | 0.3271 | 0.6257 | 0.5824 | 0.3723 |  |  |  |  |  |
| 0.8 | 0.2848 | 0.5571 | 0.6509 | 0.1700 |  | eta0 | J | Kt | 10Kq |
| 0.9 | 0.2396 | 0.4839 | 0.7092 | 0.0819 | 1 | 0.699271 | 0.882909 | 0.247325 | 0.496411 |
| 1.0 | 0.1913 | 0.4058 | 0.7503 | 0.0406 | 0 |  |  |  |  |
| 1.1 | 0.1400 | 0.3229 | 0.7591 | 0.0200 |  |  |  |  |  |
| 1.2 | 0.0857 | 0.2353 | 0.6956 | 0.0095 |  |  |  |  |  |
| 1.3 | 0.0284 | 0.1429 | 0.4112 | 0.0038 |  |  |  |  |  |

The column where the maximum efficiency obtained is selected. In this example maximum efficiency is obtained as 0.705 for the column P/D=1.2 but the column P/D=1.1 is preferred because the efficiencies are very close each other. The lower P/D values should be preferred in order to avoid cavitation risk.

The latter is an easy procedure because J, Kt, and Kq values are known;



Alternatively you can use the program “PROPCALC” with the data given below

#..... OPTIMIZASYON SECENEGI INDISINI VE GEREKLI DEGERLERI GIRINIZ .......#

3

10000. 10. 150. 1025. 4 0.5

DHP, VA, RPM, RHO, Z, AE

The output is a little bit different since the performance data are slightly different.

------------------------------------------------------------------------

 ! Program: PropCalc Versiyon: 10/12/2016 Dr. Ali Can TAKiNACI !

 ! !

 ! WAGENINGEN/GAWN SERISI PERVANE HIDRODINAMIK KARAKTERISTILERI !

 ! HESAP PROGRAMI !

 ------------------------------------------------------------------------

 Pervane Karakteristikleri - Kq/J^5 = 0.097

 ----|-------|-------|--------|--------|--------|------------|-----------|

 i P/D J Kt 10Kq eta0 Bp delta

 ----|-------|-------|--------|--------|--------|------------|-----------|

 1 0.500 0.552 0.0111 0.0496 0.1972 10.3011 183.5804

 2 0.510 0.556 0.0136 0.0517 0.2327 10.3011 182.0222

 3 0.520 0.561 0.0161 0.0540 0.2658 10.3012 180.4861

………………………………………………………………………………………………………………………………..

 45 0.940 0.749 0.1316 0.2290 0.6854 10.3012 135.1716

 46 0.950 0.753 0.1346 0.2352 0.6861 10.3012 134.4511

 47 0.960 0.757 0.1376 0.2415 0.6866 10.3012 133.7424

 **48 0.970 0.761 0.1406 0.2479 0.6870 10.3012 133.0455**

 49 0.980 0.765 0.1436 0.2544 0.6873 10.3012 132.3599

………………………………………………………………………………………………………………………………..

 68 1.170 0.835 0.2013 0.3948 0.6778 10.3012 121.2228

 69 1.180 0.839 0.2043 0.4030 0.6769 10.3012 120.7238

 70 1.190 0.842 0.2074 0.4113 0.6760 10.3012 120.2325

 HESAPLARDA WAGENINGEN B SERISI KULLANILMISTIR

 SECILEN PERVANE = 48. PERVANEDIR

 P/D=0.970

 J= 0.761 Kt= 0.141 10Kq= 0.248 eta= 0.687

 Bp= 10.3012 delta= 133.0455

 **T= 687.03** kN Va= 10.000 m/s RHO = 1025.0 kg/m3

 Z = 4. EAR = 0.500 **D = 5.255 m** Vtip = 41.3 m/s

 RPS= 2.500 dev/san RPM= 150.00 TORK= 636.617 kNm Pd= 9999.9 kW

 TAM OLCEGE EKSTRAPOLASYONDA

 VISKOZ DUZELTME YAPILMAMISTIR

 -----------------------------------------------------------------|



**2-**

|  |  |
| --- | --- |
| D(m) | 4 |
| T (kN) | 300 |
| Va(m/s) | 6 |
| N/rpm) | ? |
| P/D | ? |
| Pd(kW) | ? |

**Solution:** The problem suits for the Case 1 which is “**Optimum Rotation Rate for a Given Diameter”** since thrust and diameter have been given.

The parameters given in the problem are to be used in this case is Kt/J2 since in this parameter it ***does not contain the rotation rate***:



Each column of table given above is scanned by calculating Eta0 and value of Kt/J2 with Kt and Kq values. Then, an interpolation is performed for each column for data given in the problem as “0.508”. The performance data are obtained as shown right side of each column data.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **0.9** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kt/J^2** | **0.508** |  |  |  |  |
| 0.0 | 0.3840 | 0.4956 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.3567 | 0.4681 | 0.1213 | 35.6700 |  |  |  |  |  |
| 0.2 | 0.3263 | 0.4362 | 0.2381 | 8.1575 |  |  |  |  |  |
| 0.3 | 0.2929 | 0.3999 | 0.3497 | 3.2544 |  |  |  |  |  |
| 0.4 | 0.2564 | 0.3593 | 0.4543 | 1.6025 |  | eta0 | J | Kt | 10Kq |
| 0.5 | 0.2169 | 0.3143 | 0.5492 | 0.8676 | 1 | 0.623408 | 0.593784 | 0.176948 | 0.267971 |
| 0.6 | 0.1743 | 0.2649 | 0.6283 | 0.4842 | 0 |  |  |  |  |
| 0.7 | 0.1287 | 0.2112 | 0.6789 | 0.2627 |  |  |  |  |  |
| 0.8 | 0.0800 | 0.1513 | 0.6732 | 0.1250 |  |  |  |  |  |
| 0.9 | 0.0283 | 0.0906 | 0.4474 | 0.0349 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **1** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kt/J^4** |  |  |  |  |  |
| 0.0 | 0.4250 | 0.5994 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.3984 | 0.5698 | 0.1113 | 39.8400 |  |  |  |  |  |
| 0.2 | 0.3689 | 0.5357 | 0.2192 | 9.2225 |  |  |  |  |  |
| 0.3 | 0.3365 | 0.4971 | 0.3232 | 3.7389 |  |  |  |  |  |
| 0.4 | 0.3013 | 0.4540 | 0.4225 | 1.8831 |  |  |  |  |  |
| 0.5 | 0.2631 | 0.4064 | 0.5152 | 1.0524 |  | eta0 | J | Kt | 10Kq |
| 0.6 | 0.2221 | 0.3543 | 0.5986 | 0.6169 | 1 | 0.628076 | 0.643015 | 0.203216 | 0.329911 |
| 0.7 | 0.1782 | 0.2976 | 0.6671 | 0.3637 | 0 |  |  |  |  |
| 0.8 | 0.1314 | 0.2365 | 0.7074 | 0.2053 |  |  |  |  |  |
| 0.9 | 0.0818 | 0.1708 | 0.6860 | 0.1010 |  |  |  |  |  |
| 1.0 | 0.0292 | 0.1007 | 0.4615 | 0.0292 |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **P/D** | **1.1** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kt/J^2** |  |  |  |  |  |
| 0.0 | 0.4644 | 0.7133 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.4391 | 0.6818 | 0.1025 | 43.9100 |  |  |  |  |  |
| 0.2 | 0.4109 | 0.6456 | 0.2026 | 10.2725 |  |  |  |  |  |
| 0.3 | 0.3799 | 0.6048 | 0.2999 | 4.2211 |  |  |  |  |  |
| 0.4 | 0.3461 | 0.5594 | 0.3939 | 2.1631 |  |  |  |  |  |
| 0.5 | 0.3095 | 0.5094 | 0.4835 | 1.2380 |  | eta0 | J | Kt | 10Kq |
| 0.6 | 0.2701 | 0.4548 | 0.5671 | 0.7503 | 1 | 0.630428 | 0.684897 | 0.234189 | 0.404456 |
| 0.7 | 0.2278 | 0.3955 | 0.6417 | 0.4649 | 0 |  |  |  |  |
| 0.8 | 0.1827 | 0.3317 | 0.7013 | 0.2855 |  |  |  |  |  |
| 0.9 | 0.1348 | 0.2632 | 0.7336 | 0.1664 |  |  |  |  |  |
| 1.0 | 0.0841 | 0.1900 | 0.7045 | 0.0841 |  |  |  |  |  |
| 1.1 | 0.0305 | 0.1123 | 0.4755 | 0.0252 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **1.2** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kt/J^2** |  |  |  |  |  |
| 0.0 | 0.5022 | 0.8374 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.4787 | 0.8040 | 0.0948 | 47.8700 |  |  |  |  |  |
| 0.2 | 0.4523 | 0.7659 | 0.1880 | 11.3075 |  |  |  |  |  |
| 0.3 | 0.4231 | 0.7231 | 0.2794 | 4.7011 |  |  |  |  |  |
| 0.4 | 0.3910 | 0.6757 | 0.3684 | 2.4438 |  |  |  |  |  |
| 0.5 | 0.3560 | 0.6234 | 0.4544 | 1.4240 |  |  |  |  |  |
| 0.6 | 0.3181 | 0.5665 | 0.5362 | 0.8836 |  |  |  |  |  |
| 0.7 | 0.2774 | 0.5049 | 0.6121 | 0.5661 |  | eta0 | J | Kt | 10Kq |
| 0.8 | 0.2338 | 0.4385 | 0.6789 | 0.3653 | 1 | 0.62395 | 0.693481 | 0.283225 | 0.514129 |
| 0.9 | 0.1874 | 0.3675 | 0.7304 | 0.2314 | 0 |  |  |  |  |
| 1.0 | 0.1381 | 0.2917 | 0.7535 | 0.1381 |  |  |  |  |  |
| 1.1 | 0.0859 | 0.2113 | 0.7117 | 0.0710 |  |  |  |  |  |
| 1.2 | 0.0308 | 0.1261 | 0.4665 | 0.0214 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P/D** | **1.3** |  |  |  |  |  |  |  |  |
| **J** | **Kt** | **10Kq** | **0** | **Kt/J^2** |  |  |  |  |  |
| 0.0 | 0.5384 | 0.9717 | 0.0000 | - |  |  |  |  |  |
| 0.1 | 0.5173 | 0.9366 | 0.0879 | 51.7300 |  |  |  |  |  |
| 0.2 | 0.4931 | 0.8967 | 0.1750 | 12.3275 |  |  |  |  |  |
| 0.3 | 0.4959 | 0.8520 | 0.2779 | 5.5100 |  |  |  |  |  |
| 0.4 | 0.4358 | 0.8026 | 0.3457 | 2.7238 |  |  |  |  |  |
| 0.5 | 0.4026 | 0.7484 | 0.4281 | 1.6104 |  |  |  |  |  |
| 0.6 | 0.3663 | 0.6894 | 0.5074 | 1.0175 |  | eta0 | J | Kt | 10Kq |
| 0.7 | 0.3271 | 0.6257 | 0.5824 | 0.6676 | 1 | 0.631516 | 0.771692 | 0.296774 | 0.576519 |
| 0.8 | 0.2848 | 0.5571 | 0.6509 | 0.4450 | 0 |  |  |  |  |
| 0.9 | 0.2396 | 0.4839 | 0.7092 | 0.2958 |  |  |  |  |  |
| 1.0 | 0.1913 | 0.4058 | 0.7503 | 0.1913 |  |  |  |  |  |
| 1.1 | 0.1400 | 0.3229 | 0.7591 | 0.1157 |  |  |  |  |  |
| 1.2 | 0.0857 | 0.2353 | 0.6956 | 0.0595 |  |  |  |  |  |
| 1.3 | 0.0284 | 0.1429 | 0.4112 | 0.0168 |  |  |  |  |  |

The column where the maximum efficiency obtained is selected. In this example maximum efficiency is obtained as 0.630 for the column P/D=1.1..

The latter is an easy procedure because J, Kt, and Kq values are known;



Alternatively you can use the program “PROPCALC” with the data given below

#..... OPTIMIZASYON SECENEGI INDISINI VE GEREKLI DEGERLERI GIRINIZ .......#

1

300. 4. 6.0 1025. 4. 0.5

T, D, VA, RHO, Z, AE

------------------------------------------------------------------------

 ! Program: PropCalc Versiyon: 10/12/2016 Dr. Ali Can TAKiNACI !

 ! !

 ! WAGENINGEN/GAWN SERISI PERVANE HIDRODINAMIK KARAKTERISTILERI !

 ! HESAP PROGRAMI !

 ------------------------------------------------------------------------

 Pervane Karakteristikleri - Kt/J^2 = 0.508

 i P/D J Kt 10Kq eta0 Bp delta

 ---|-------|-------|--------|--------|--------|------------|---------|

 1 0.500 0.390 0.0773 0.0957 0.5010 34.0704 259.6974

 2 0.510 0.396 0.0795 0.0985 0.5082 33.3434 255.9797

 41 0.900 0.595 0.1796 0.2760 0.6158 20.1554 170.3192

 42 0.910 0.599 0.1824 0.2823 0.6159 19.9998 169.0270

 43 0.920 0.604 0.1851 0.2887 0.6160 19.8485 167.7616

 44 0.930 0.608 0.1879 0.2952 0.6161 19.7014 166.5225

 45 0.940 0.613 0.1907 0.3018 0.6160 19.5582 165.3085

 88 1.370 0.782 0.3106 0.6528 0.5920 15.6320 129.5260

 89 1.380 0.785 0.3134 0.6620 0.5916 15.5681 128.9514

 90 1.390 0.789 0.3161 0.6712 0.5913 15.5047 128.3845

 91 1.400 0.792 0.3189 0.6805 0.5909 15.4415 127.8250

 ---|-------|-------|--------|--------|--------|----- ------|-----------|

 HESAPLARDA WAGENINGEN B SERISI KULLANILMISTIR

 SECILEN PERVANE = 43. PERVANEDIR

 P/D=0.920

 J= 0.604 Kt= 0.185 10Kq= 0.289 eta= 0.616

 Bp= 19.8485 delta= 167.7616

 T= 300.00 kN Va= 6.000 m/s RHO = 1025.0 kg/m3

 Z = 4. EAR = 0.500 D = 4.000 m

 Vtip= 31.23 m/s

 RPS= 2.485 dev/san RPM= 149.10 TORK= 187.143 kNm Pd= 2922.0 kW

 TAM OLCEGE EKSTRAPOLASYONDA

 VISKOZ DUZELTME YAPILMAMISTIR

 -----------------------------------------------------------------|

As it was in the previous example the output is different since the performance data are different.



**3-**

This question is typical Bollard Pull problem. Instead of using µ- σ-φ diagrams, The program “PROPCALC” is to be run with the data given below,

#..... OPTIMIZASYON SECENEGI INDISINI VE GEREKLI DEGERLERI GIRINIZ .......#

4

1000. 120. 1025. 4 .50 3.3 3.4 3.5

DHP, RPM, RHO, Z, AE, D1, D2, D3

One obtains,

------------------------------------------------------------------------

 ! Program: PropCalc Versiyon: 10/12/2016 Dr. Ali Can TAKiNACI !

 ! !

 ! WAGENINGEN/GAWN SERISI PERVANE HIDRODINAMIK KARAKTERISTILERI !

 ! HESAP PROGRAMI !

 ------------------------------------------------------------------------

 Pervane Karakteristikleri

 ---|-------|--------|-------|--------|---------|

 i D 10Kq P/D Kt T(N)

 ---|-------|--------|-------|--------|---------|

 1 3.300 0.4957 0.911 0.3783 183940.

 2 3.400 0.4270 0.840 0.3492 191305.

 3 3.500 0.3692 0.775 0.3219 198036.

 ---|-------|--------|-------|--------|---------|

 HESAPLARDA WAGENINGEN B SERISI KULLANILMISTIR

 SECILEN PERVANE =

 **P/D=0.775** Kt= 0.322 10Kq= 0.369

 RPS= 2.000 RPM=120.000 T= 198.036 kN D= 3.500 m

 Z= 4 EAR=0.500

 RHO = 1025.0 kg/m3

 TORK= 79.504 kNm Pd= 999.1 kW

 TAM OLCEGE EKSTRAPOLASYONDA

 VISKOZ DUZELTME YAPILMAMISTIR

 -----------------------------------------------------------------|