4 cont'd Plotting $T_L$ on motor characteristic leads to problem exactly similar to previous problem except that system inertia in (3) is

$J = J_{motor} + J_{load}/R^2 = J_{motor} + 400/5.75^2$ kgm$^2$

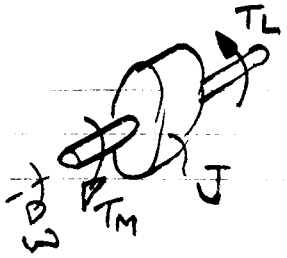
It will be found that acceleration time is too large for 132M motor and next size up, 132MD, is still no good. Have to use a 160M motor — or, much better, a 132M with hydraulic or other coupling.

******
MOTORS
******

version 3a
by Doug Wright

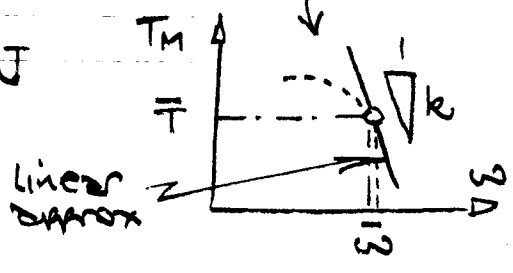
| | | | | | |
|---|---|---|---|---|---|
| TITLE - problem #4 - 132M motor | | | | | |
| MOTOR - full load speed | 1440 | rpm | LOAD - reference speed | 250 | rpm |
| full load torque | 50.0 | Nm | constant torque | 125.0 | Nm |
| starting torque | 150.0 | Nm | linear torque | 0.0 | Nm |
| breakaway torque | 170.0 | Nm | quadratic torque | 125.0 | Nm |
| inertia moment | 0.023 | kg.m**2 | inertia moment | 400.00 | kg.m**2 |
| running speed | 1448 | rpm | running speed | 252 | rpm |
| running torque | 43.8 | Nm | running torque | 252.0 | Nm |
| acceleration time | 21.0 | sec | REDUCER - ratio | 5.750 | :1 |
| TITLE - problem #4 - 132MD motor | | | | | |
| MOTOR - full load speed | 1450 | rpm | LOAD - reference speed | 250 | rpm |
| full load torque | 60.0 | Nm | constant torque | 125.0 | Nm |
| starting torque | 132.0 | Nm | linear torque | 0.0 | Nm |
| breakaway torque | 162.0 | Nm | quadratic torque | 125.0 | Nm |
| inertia moment | 0.036 | kg.m**2 | inertia moment | 400.00 | kg.m**2 |
| running speed | 1465 | rpm | running speed | 255 | rpm |
| running torque | 44.4 | Nm | running torque | 255.2 | Nm |
| acceleration time | 21.4 | sec | REDUCER - ratio | 5.750 | :1 |
| TITLE - problem #4 - 160M motor | | | | | |
| MOTOR - full load speed | 1450 | rpm | LOAD - reference speed | 250 | rpm |
| full load torque | 72.0 | Nm | constant torque | 125.0 | Nm |
| starting torque | 201.6 | Nm | linear torque | 0.0 | Nm |
| breakaway torque | 216.0 | Nm | quadratic torque | 125.0 | Nm |
| inertia moment | 0.073 | kg.m**2 | inertia moment | 400.00 | kg.m**2 |
| running speed | 1472 | rpm | running speed | 256 | rpm |
| running torque | 44.5 | Nm | running torque | 256.1 | Nm |
| acceleration time | 14.4 | sec | REDUCER - ratio | 5.750 | :1 |

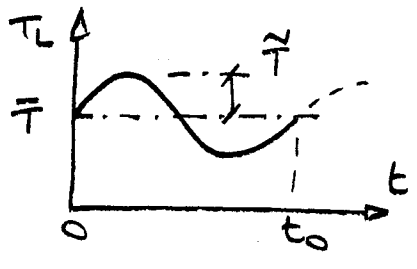
5




For the system (motor + load):

$T_M - T_L = J\alpha$ , $\alpha = d\omega/dt = \dot{\omega}$




$T_M = \bar{T} + k(\bar{\omega} - \omega)$ $\quad T_L = \bar{T} + \tilde{T}\sin(2\pi t/t_0)$.

where $\bar{\omega}$ is the operating speed corresponding to mean torque $\bar{T}$.

Combining the torque expressions into the equation of motion: