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| Beam Stiffness Equations | |
| **M**  **P**  **T**  **F**  **L** | |
| Axial Stiffness |  |
| Vertical Bending Stiffness |  |
| Vertical Shear Stiffness |  |
| Torsional Stiffness |  |
| Bending Stiffness |  |
| Notation  E = Young’s modulus  G = Shear modulus  A = Area of beam  As = Shear area of beam  I = Second moment of area of beam  K = Torsional stiffness constant of beam  L = Length of beam | P = Axial force  F = Vertical force  M = Bending moment  T = Torsional moment  = Displacement  = Rotation  ( and measured at the location of the  corresponding force and moment) |