MTM Assignment 050417

Prob. 1

Given:

Cutting mode: orthogonal, orthogonal rake=0°

Show that rate of heating in the primary shear zone= $P_z V_c (1-\mu\zeta)$

Prob. 2

Given:

Cutting mode: orthogonal, orthogonal rake=0°

Specific cutting energy= 2.8 GN/m^2, $\mu=0.5$, $\zeta=2$, $\rho=7200$ kg/m^3, c=500 J/kgK. Determine mean shear zone temperature.

Prob. 3

Given:

Cutting mode: orthogonal, orthogonal rake=0°

P_z = 1000 N, P_{xy} = 600 N, V_c = 100 m/min, a_1 = 0.2 mm, b_1 = 2 mm, ζ = 2

Assume 10% of shearing heat is conducted into the workpiece.

Determine

    i)   mean temperature rise in the primary shear zone.
    ii)   Mean temperature rise of the chip resulting from secondary deformation

Prob. 4

Given:

Cutting mode: orthogonal, orthogonal rake=γ_o

$F = T_s a_1 b_1$ where T_s = dynamic yield shear strength of the work material

Show that $\mu = \cos^2 (\beta - \gamma_o) / \left\{ \sin (\beta - \gamma_o) \cos (\beta - \gamma_o) + 1 \right\}$