$E = 185000\ N/mm^2$ $\nu = 0.27$ $E_i = E_o$ $\nu_i = \nu_o$

$OD = 18.57mm$ $ID = 8mm$ (Hub)

$D_i = 0$ (Shaft) $\Delta = 0.007mm$

Interface Pressure

$$P_c = \frac{\Delta}{D_c} \cdot \frac{1}{\left(\frac{D_c^2 + D_i^2}{E_i(D_c^2 - D_i^2)}\right) + \left(\frac{D_o^2 + D_c^2}{E_o(D_o^2 - D_c^2)}\right) - \cancel{\frac{\nu_i}{E_i}} + \cancel{\frac{\nu_o}{E_o}}}$$

$$P_c = \frac{0.007}{8} \cdot \frac{1}{\left(\frac{8^2 + 0}{185\times10^3(8^2 - 0)}\right) + \left(\frac{18.57^2 + 8^2}{185\times10^3(18.57^2 - 8^2)}\right) - 0}$$

$$P_c = \frac{0.000875}{5.405405\times10^{-6} + 7.869014\times10^{-6}} = 65.916\ N/mm^2$$

Stress at Interface

$$\sigma_r = -P_c = -65.916\ N/mm^2$$

$$\sigma_\theta = P_c\left(\frac{D_o^2 + D_I^2}{D_o^2 - D_I^2}\right) = 65.916\left(\frac{18.57^2 + 8^2}{18.57^2 - 8^2}\right) = 65.916 \cdot 1.456 = 95.958\ N/mm^2$$

$$\sigma_z = 0$$

Von Mises Stress At Interface

$$\sigma_{vm} = \sqrt{\frac{(\sigma_r - \sigma_\theta)^2 + (\sigma_\theta - \sigma_z)^2 + (\sigma_r - \sigma_z)^2}{2}}$$

$$\sigma_{vm} = \sqrt{\frac{(-65.916 - 95.958)^2 + (95.958 - 0)^2 + (-65.916 - 0)^2}{2}} = 140.99\ N/mm^2$$