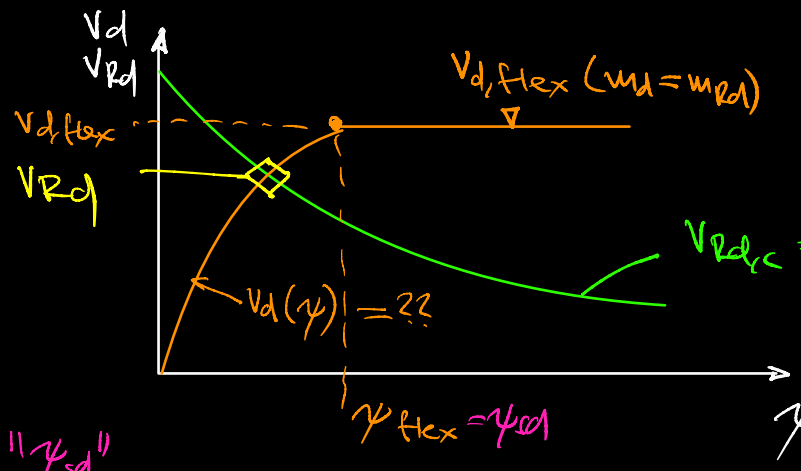
Punching shear



"ψ_{sd}"

$$\psi = \boxed{1.5\ (1.2) \cdot \frac{r_s}{d} \cdot \frac{f_{sd}}{E_{sd}}} \left(\frac{m_{sd}}{m_{Rd}}\right)^{3/2} = \psi_{ssd} \left(\frac{m_{sd}}{m_{Rd}}\right)^{3/2} \quad ; \quad \frac{\psi}{\psi_{sd}} = \left(\frac{m_{sd}}{m_{Rd}}\right)^{3/2} \Big| \square^{2/3}$$

$$\frac{m_{sd}}{m_{Rd}} = \left(\frac{\psi}{\psi_{sd}}\right)^{2/3} = \frac{V_d(m_{sd})}{V(m_{Rd})} = \frac{V_{sd}}{V_{flex}}$$

m proportional to V
- simplified: $m \approx \frac{V}{\beta}$
- refined: FE analysis

$V \leftrightarrow m$

$$\frac{V_d}{V_{flex}} = \left(\frac{\psi}{\psi_{sd}}\right)^{2/3}$$

$$V_d(\psi) = V_{flex} \cdot \left(\frac{\psi}{\psi_{sd}}\right)^{2/3}$$