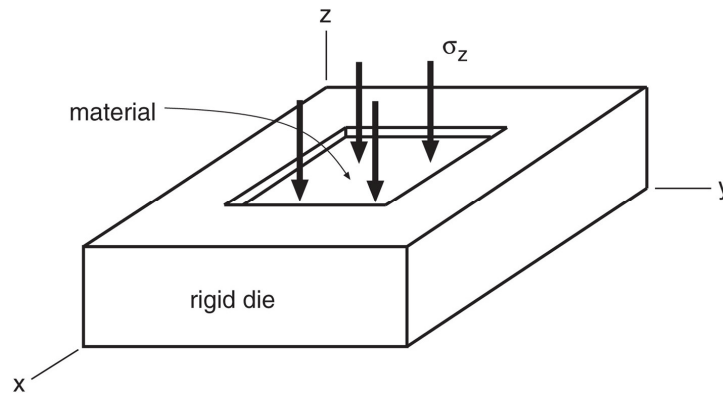


Please answer all questions in the homework format listed on the website.

- 1) Dowling, Problem 4.6.
- 2) What is the modulus of elasticity and Poisson's ratio for a material with a shear modulus of 37.5 MPa and a bulk modulus of 50 MPa?
- 3) Consider a sample of titanium (Table 5.2) subjected to compression in the  $z$ -direction of 100 MPa and confined by a rigid die in the  $x$ - and  $y$ -direction so that it cannot deform in either of those directions as shown in Figure 1. (a) What are the stresses in the  $x$ - and  $y$ -directions? (b) What is the effective stiffness in the  $z$ -direction? (c) What is the volumetric strain? (d) What is the hydrostatic stress?



**Figure 1.** Material in rigid die subjected to compressive load  $\sigma_z$ .

Suggested problems:

Dowling 4.1, 4.16

Dowling 4.9 Ans:  $E = 155.5$  GPa,  $\%el = 0.816\%$  (at fracture),  $0.48\%$  (after fracture)

Dowling 5.16 Ans:  $\epsilon_z = -737 \mu\epsilon$

Dowling 5.19 Ans:  $\Delta r = pr^2(1-\nu)/(2tE)$

Dowling 7.23 assume  $\sigma_0 = -260$  MPa,  $\nu = 0.293$  in compression, Ans: (c)  $-444$  MPa