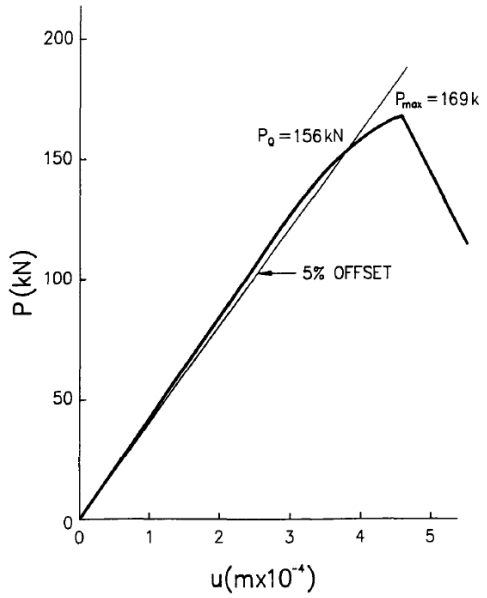
تکلیف سری ششم مکانیک شکست موعد تحویل: سه‌شنبه ۹۸/۲/۳۱ در کلاس

1- The following Figure shows the load-displacement record of a compact tension specimen tested according to ASTM E399 procedure to determine K_{Ic}. The 0.2 per cent offset yield stress of the material is 800 MPa. The specimen dimensions were measured as: W = 12 cm, B = 5 cm, a = 6 cm. Determine K_{IC}.



$$K_Q = \frac{P_Q}{BW^{1/2}} f\left(\frac{a}{W}\right)$$

$$f\left(\frac{a}{W}\right) = \frac{2+\frac{a}{W}}{\left(1-\frac{a}{W}\right)^{3/2}}\left(0.886+4.64\left(\frac{a}{W}\right)-13.32\left(\frac{a}{W}\right)^2+14.72\left(\frac{a}{W}\right)^3-5.60\left(\frac{a}{W}\right)^4\right)$$

2- Determine the minimum thickness $B_{\min}$ and/or crack ligament $b_{\min}$ of a three-point bend specimen required for a valid J_{IC}, test according to the ASTM standards for a material with K_{IC}=100 MPa.m$^{1/2}$, σ_Y = 400 MPa, E = 210 GPa and ν = 0.3. Compare the results with those for a valid K_{IC}, test.

3- The following data were obtained from a series of tests on three-point bend specimens with thickness B = 30 mm and crack ligament b = 30 mm made of a steel with 0.2 offset yield stress σ_Y = 450 MPa and ultimate stress σ_u = 550 MPa. Estimate the provisional value J_Q according to ASTM standard E813-87 and check whether $J_{IC} = J_Q$.

J(kJ/m^2)	Δa(mm)
120	0.2
150	0.3
180	0.5
220	0.7
260	1.0
280	1.2
310	1.5
340	1.8
360	2.0