Fracture toughness characterization through notched small punch test specimens - DTU Orbit (05/12/2018)

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In this work a novel methodology for fracture toughness characterization by means of the small punch test (SPT) is presented. Notched specimens are employed and fracture resistance is assessed through a critical value of the notch mouth displacement \( \Delta(SPT) \). Finite element simulations and interrupted experiments are used to track the evolution of \( \Delta(SPT) \) as a function of the punch displacement. The onset of crack propagation is identified by means of a ductile damage model and the outcome is compared to the crack tip opening displacement estimated from conventional tests at crack initiation. The proposed numerical-experimental scheme is examined with two different grades of CrMoV steel and the differences in material toughness captured. Limitations and uncertainties arising from the different damage phenomena observed in the lowest toughness material examined are thoroughly discussed. (C) 2016 Elsevier B.V. All rights reserved.

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