SEMINARIO

Università degli Studi di Pavia

Dipartimento di Meccanica Strutturale

In collaborazione con

Centro di Simulazione Numerica Avanzata – CeSNA
Istituto Universitario di Studi Superiori

The unrestrainable growth of a shear band in a prestressed material

Localized deformations in the form of shear bands emerging from a slowly varying deformation field are known to be the preferential near-failure deformation modes of ductile materials. Therefore, shear band formation is the key concept to explain failure in many materials and, according to its theoretical and .practical. importance, it has been the focus of an enormous research effort in the last 30 years. From the theoretical point of view, this effort has been mainly directed in two ways, namely the dissection of the specific constitutive features responsible for strain localization in different materials and the struggle for the overcoming of difficulties connected with numerical approaches.Although these problems still seem far from being definitely solved, the most important questions in this research area have only marginally been approached and are therefore still awaiting explanation. They are as follows.

(i) The highly inhomogeneous stress/deformation state developing near a shear band tip is unknown from an analytical point of view (and numerical techniques can hardly have the appropriate resolution to detail this).

(ii) It is not known if a shear band tip involves a strong stress concentration.

(iii) The fact that shear bands grow quasi-statically and rectilinearly for remarkably long distances under mode II loading conditions, while the same feature is not observed in the akin problem of crack growth, remains unexplained.

(iv) Finally, and most importantly, the reason why shear bands are preferential failure modes for quasi-statically deformed ductile materials has no justification.In the talk we will provide answers to the above questions.

Prof. Davide Bigoni
Dipartimento di Ingegneria Meccanica e Strutturale
Università di Trento, Trento, Italia

Lunedì 1 Febbraio, Aula MS1
Seminar tentative schedule: 12.00 – 13.00
Dipartimento di Meccanica Strutturale
Via Ferrata,1 – Pavia

Organizzato con il contributo della Fondazione Cariplo attraverso il finanziamento del progetto n. 2009-2822