Local approaches for fracture and fatigue design: Recent developments and future perspectives
Polo Fabio Ferrari 2, via Sommarive 9, Trento

Speaker Lecturer: Filippo Berto
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Wednesday 18 March 2020, 14-17 Girasole room:
Introduction to fracture and fatigue problems: how we can speak the same language
The main aim of the first lecture is to provide a complete introduction to fracture and fatigue problems providing basic concepts and understanding the importance of these concepts for practical applications and accurate design of simple and complex structures/products/components. Emphasis will be placed on the difference between classical nominal approaches and stress field approaches which are important in presence of severe stress gradients.

Thursday 19 March 2020, 14-17 Girasole room:
Introduction to local approaches for fracture and fatigue assessment: how we can treat stress singularities
The second lecture of the course will be dedicated to a more detailed introduction of local approaches aimed to assess the fracture and fatigue behavior in presence of stress gradients. Special attention will be dedicated to the introduction of analytical tools that allow to treat properly sharp notches in a generalized way. Differences between crack stress singularities and notch stress singularities will be properly discussed introducing some fundamental pioneering solutions which are the basis of notch mechanics.

Wednesday 25 March, 9-12 Seminar room:
Fatigue assessment of welded joints: how we can use what we learn about stress singularities
The third lecture will be dedicated to a design problem. Weldments are critical in many engineering applications and there are different criteria available for their fracture and fatigue assessment. Light will be put on how to extend the knowledge developed in lectures 1 and 2 to the fatigue assessment of welded joints treating properly stress singularities with a local stress field approach.

Thursday 26 March, 9-12 Seminar room:
Fatigue assessment based on energy approaches: how we can use an efficient tool for fatigue design of complex structures
The fourth lecture will be focused on based on energy approaches for fatigue design and assessment. Recent developed criteria will be introduced discussing how to treat properly complex three-dimensional structures. The advantages of energy approaches in terms of computation flexibility will be discussed. Some applications will be shown to make clear the advantages of the introduced approaches. Three-dimensional effects will be accurately discussed.

Biosketch
Prof. Berto is Chair of Structural Integrity at the Norwegian University of Science and Technology where he has been leading the fatigue and testing laboratory since 2016. He is author of several technical papers, mainly oriented to materials science engineering, the brittle failure of different materials, notch effect, the application of the finite element method to the structural analysis, the mechanical behaviour of metallic materials, the fatigue performance of notched components as well as the reliability of welded, bolted and bonded joints. Since 2003, he has been working on different aspects of the Structural Integrity discipline, by mainly focusing attention on problems related to the static and fatigue assessment of engineering materials and components.

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