



UNIVERSITY OF PISA

Department of Civil and Industrial Engineering

Visiting Fellows Programme 2021

On Friday 23 July 2021 from 9:00 to 10:00

Dr. Konrad DADEJ

Lecturer at Lublin University of Technology, Poland,
and Visiting Fellow at the University of Pisa, Italy,

will give a seminar titled

Modeling of fatigue crack growth in hybrid fiber metal laminates

Abstract. Fiber metal laminates (FMLs) are layered materials consisting of fiber-reinforced polymers and metals. FMLs are featured by excellent resistance to fatigue crack growth, which is ensured by the 'bridging effect' – a load transfer from already cracked metal layers into intact fibers through the adhesive joint. As a consequence of the 'bridging effect', the stress intensity factor at the already formed fatigue crack tip is decreased which strongly reduces fatigue crack growth rate, when compared to the monolithic metals. Many analytical, experimental, and phenomenological models have been invented to predict fatigue crack growth rate in FMLs. However, most of them require a cumbersome calculation of crack tip opening displacement and bridging load over the delamination shape. This study aims to present a new simplified analytical model, based on Classical Lamination Plate Theory for the prediction of fatigue crack growth in FML with arbitrary layup and configuration, as well as for arbitrary crack lengths. The proposed model is based on the concept of load redistribution corresponding to fatigue crack growth. Analytical predictions were validated by a series of experimental tensile-tensile fatigue crack growth tests performed on fiber metal laminates reinforced by the glass, carbon, and hybrid glass/carbon fibers, while a good convergence of results was obtained.

The seminar will be offered through Microsoft Teams at <https://tinyurl.com/adxz84pk>

For further information, please contact Prof. Paolo S. VALVO (p.valvo@ing.unipi.it).

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