

Contribution ID: 285

Type: **Presentazione orale**

Implementation of a combined Quasi-Brittle/Ductile Damage Model for assessing the fatigue life of Combustion Chamber Channels using FEniCSx+MFront.

Wednesday 2 September 2026 15:30 (15 minutes)

The aim of this study is to assess the fatigue life of combustion chamber channels in a liquid-propellant rocket engine (LRE) for aerospace applications. In order to increase the durability and service life of thrust chamber, a reliable and robust strategy for predicting damage mechanisms is required. Within this context, a combination of the Lemaitre-Dufally quasi-brittle damage model and the Bonora ductile damage model was implemented to improve the understanding of the fracture mechanisms of complex structure. The resulting model was developed using the open-source finite element (FE) code FEniCSx, combined with the open-source MFront tool to define the constitutive laws. Such a numerical procedure was chosen in order to overcome the limitations and cumbersomeness of commercial FE codes in the implementation of custom complex material models. The numerical results obtained from the analysis were compared with experimental data reported in the literature, showing satisfactory agreement and providing an effective tool for addressing fatigue and damage material behaviour of structural components.

Primary authors: GALLO, Antonio (Università degli Studi di Napoli Federico II); ARMENTANI, Enrico (Università degli Studi di Napoli Federico II); Prof. ABBIATI, Giuseppe (University of Aarhus); Mr LARSON DEGN, Jakob (University of Aarhus); Dr FERRAIUOLO, Michele (CIRA S.c.p.a.); PERRELLA, Michele (Università degli Studi di Napoli Federico II)

Presenter: GALLO, Antonio (Università degli Studi di Napoli Federico II)

Session Classification: Fatica e Frattura

Track Classification: Fatica e Frattura