Neural simulation of plastic phenomena using MeshGraphNets

Mikel M Iparraguirre*[1], Elias Cueto†[1], Iciar Alfaro[1], and Francisco Chinesta[2,3]

[1]ESI Group-UZ Chair of the National Strategy on Artificial Intelligence. Aragon Institute of Engineering Research (I3A). Universidad de Zaragoza. – Spain
[2]ESI Group chair. PIMM Lab. ENSAM Institute of Technology. – ESI Group chair. PIMM Lab. ENSAM Institute of Technology – France
[3]CNRS@CREATE LTD – Singapore

Abstract

This work investigates the use of MeshGraphNets, a deep learning framework, to simulate plastic forming processes. Our database consists of synthetic data coming from high-fidelity finite element simulations. The deep learning model accurately captures the complex behavior of plastic phenomena for non-monothonic loading trajectories. Examples will be provided that demonstrate the robustness and accuracy of our approach in out-of-distribution cases, thus proving the feasibility of neural simulators for industrial use.

*Speaker
†Corresponding author: ecueto@unizar.es