

A data-driven computational approach for history-dependent materials

Pierre Ladevèze, Paul-William Gerbaud and David Néron

Université Paris-Saclay, ENS Paris-Saclay, CNRS, LMT
Laboratoire de Mécanique et Technologie
4 avenue des Sciences, 91190 Gif-sur-Yvette, France
e-mail: {ladeveze,gerbaud,neron}@ens-paris-saclay.fr

ABSTRACT

Within the framework of the thermodynamics of irreversible processes, this work introduces a general vision of data-driven computational mechanics, adapted to history-dependent materials, through the concept of Hierarchical Experimental Constitutive Manifold (H-ECM). The mathematical structure of H-ECM, that involves internal state variables, constitutes the material model associated with the experimental data for computation. The hidden internal variables are not known a priori but are calculated from the experimental data thanks to the so-called “Central Problem” of H-ECM.

This talk is a first attempt to present the fundamentals of this data-driven approach and the questions it raises. The potential applications will be illustrated, in particular the possibility of transforming the multi-scale FE2 calculation method into a simple FE method.

REFERENCES

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