

MATERIAL POINT METHOD FOR MICROMECHANICAL MODELLING

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Abstract

The Finite Element Method (FEM) and its variants have been in use for mechanical modelling for a long time, even at micro- and nanoscale. Due to its principles, standard FEM is not convenient for problems involving large deformations of the material or presence of cracks and discontinuities. In recent decades, extensions of FEM have been developed to better cope with such difficulties, and new methods based on different methodologies have been introduced, with the Material Point Method (MPM) being one of them.

Using an open-source MPM engine, we will demonstrate application of the method to some problems of common interest and investigation, such as beam bending (used to determine properties of AFM cantilevers), nanopillar compression and nanoindentation.

Keywords: MPM mechanics modelling

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