



# **The Material Point Method: A Continuum-Based Particle Method for Extreme Loading Cases (Tsinghua University Press Computational Mechanics Series)**

*Xiong Zhang, Zhen Chen, Yan Liu*

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*The Material Point Method: A Continuum-Based Particle Method for Extreme Loading Cases* systematically introduces the theory, code design, and application of the material point method, covering subjects such as the spatial and temporal discretization of MPM, frequently-used strength models and equations of state of materials, contact algorithms in MPM, adaptive MPM, the hybrid/coupled material point finite element method, object-oriented programming of MPM, and the application of MPM in impact, explosion, and metal forming.

Recent progresses are also stated in this monograph, including improvement of efficiency, memory storage, coupling/combination with the finite element method, the contact algorithm, and their application to problems.

- Provides a user's guide and several numerical examples of the MPM3D-F90 code that can be downloaded from a website
- Presents models that describe different types of material behaviors, with a focus on extreme events.
- Includes applications of MPM and its extensions in extreme events, such as transient crack propagation, impact/penetration, blast, fluid-structure interaction, and biomechanical responses to extreme loading

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