



# Geo-disaster Modeling and Analysis: An SPH-based Approach (Springer Natural Hazards)

*Yu Huang, Zili Dai, Weijie Zhang*

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Through application of the Smoothed Particle Hydrodynamics (SPH) method, this monograph mainly focuses on large deformations and flow failure simulations of geomaterials and movement behavior, which are always involved in geo-disasters. The work covers the theoretical background, numerical techniques, code implementation issues, and many novel and interesting applications. Two-dimensional and three-dimensional SPH models in the framework of both hydrodynamics and solid mechanics are established, with detailed descriptions. The monograph also contains many appealing and practical examples of geo-disaster modeling and analysis, including the fluidized movement of flow-like landslides, lateral spread of liquefied soils, and flow slides in landfills. In the documented SPH simulations, the propagation of geo-disasters is effectively reproduced. Dynamic behaviors of geomaterials during propagation are ascertained, including sliding path, flow velocity, maximum distance reached, and distribution of deposits. In this way, the monograph presents a means for mapping hazardous areas, estimating hazard intensity, and identifying and designing appropriate protective measures.

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