

The Material Point Method in Soil Mechanics Problems

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The dynamic soil mechanics problems like failure of a retaining wall and pile driving are investigated. As these problems are characterised by large strains, they are hard to analyse – due to severe mesh distortions – by the use of the finite element method (FEM) formulated in the Lagrangian frame, the most popular computational tool in engineering practise. This disadvantage of FEM is avoided in the present paper by applying the material point method (MPM) which can be regarded as FEM formulated in an arbitrary Lagrangian–Eulerian description of motion. Two kinds of space discretisation are employed in MPM: the motion of material points representing subregions of the analysed body is traced with respect to the Eulerian mesh. Such an approach makes the method very flexible and capable to handle large strain problems. The case of non-cohesive models of the soil is analysed; the elastic–plastic and elastic–viscoplastic material models are applied.

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