

# **An implicit time integration high-order material point method for small and large deformation problems: Formulation and analysis within the isogeometric framework**

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## **ABSTRACT**

The material point method (MPM) is a version of the particle-in-cell (PIC) which has substantial advantages over pure Lagrangian or Eulerian methods in numerical simulations of problems involving large deformations. Using MPM helps to avoid mesh distortion and tangling problems related to Lagrangian methods and the advection errors associated with Eulerian methods are avoided. In this paper a novel high-order material point method within an isogeometric analysis (IGA) framework is developed. Utilizing high order basis functions enables more accurate determination of physical state variables e.g. stress. The smooth spline function spaces are used to eliminate the non-physical effects are caused by use of standard high-order finite element basis function i.e. based on Lagrange polynomials. Additionally an implicit time integration high-order material point method is proposed.

## **References**

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