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Thermomechanical total Lagrangian SPH formulation for solid mechanics in large deformation problems

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5 **mechanics in large deformation problems**  
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25 **Abstract**  
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27 Challenging problems of computational mechanics may often be characterised by  
28 large deformations that are common in manufacturing processes such as forging. The  
29 finite element method faces difficulties in simulating large deformations, due to severe  
30 mesh distortion. A solution to overcome these difficulties is to use meshless methods like  
31 Smoothed Particle Hydrodynamics (SPH). This paper presents a thermomechanical SPH  
32 in total Lagrangian formulation to simulate efficiently large deformations  
33 thermomechanical problems. The continuum is modelled as a Hamiltonian system of  
34 particles (energy-based framework) when dissipative effects are considered where the  
35 constitutive equation is represented via an internal energy term. A comparison with an  
36 Eulerian SPH formulation and FEM is presented to assess the accuracy of the total  
37 Lagrangian formulation through examples of high velocity Taylor impact test and hot  
38 forging test.  
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53 **Keywords**  
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55 SPH, Eulerian, total Lagrangian, thermomechanical, large deformations, Abaqus.  
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