An Inverse Analysis Method Applied to Optimization of Specimen's Shape for Performing Hot Rapid Crushing Tests from Homogeneous Initial Temperature Field

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Abstract. Specific experimental tests with loadings conditions close to those of industrial fast forming processes as rapid forging, rapid stamping or high speed machining, characterized by large plastic strains, localized deformations and important gradients of strain rates, strain and temperature, requires to analyses material flow behavior at different initial temperatures. One of the more important conditions to obtain intrinsic rheological constitutive equations is to have a quasi-homogenous initial temperature distribution and especially to keep constant the material microstructure during the specimens heating. The rapid induction heating seems to be one of the most reliable processes. This scientific study proposes an inverse analysis technique based on numerical finite element modelling to define on the thermal point of view, optimal specimen shapes for performing hot rapid crushing tests from homogenous initial temperature field.

Keywords: hot SHPB pressing, thermal cooling, FEM, inverse analysis

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