A 2D perturbation model to assess the onset of adiabatic shear bands in metallic sheets subjected to shear-compression loading

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ABSTRACT

In this work we have developed a 2D analytical model to analyse the formation of adiabatic shear bands in metallic sheets subjected to shear dominated loading. Namely, we have focused our attention of the effect that compressive stresses normal to the shear plane have on the inception of shear instabilities. Our theoretical results have been confronted against Finite Element calculations specifically conducted for this goal. In the numerical calculations, in order to trigger the shear instability, the material properties are varied randomly within the specimen. The outcomes of this comparison, which allow to obtain new insights into the inception of shear bands under shear dominated loading will be discussed in detail. The limitations of our modelling will also be pointed out.