

Incompatibility-governed deformations : towards an interpretation in terms of continuously distributed dislocations

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It has been proven in our recent previous work that we could use an incremental variational model of elastoplasticity based on a suitable deformation field E , and its incompatibility $inc E$. Maps of this incompatibility in 2D could be computed.

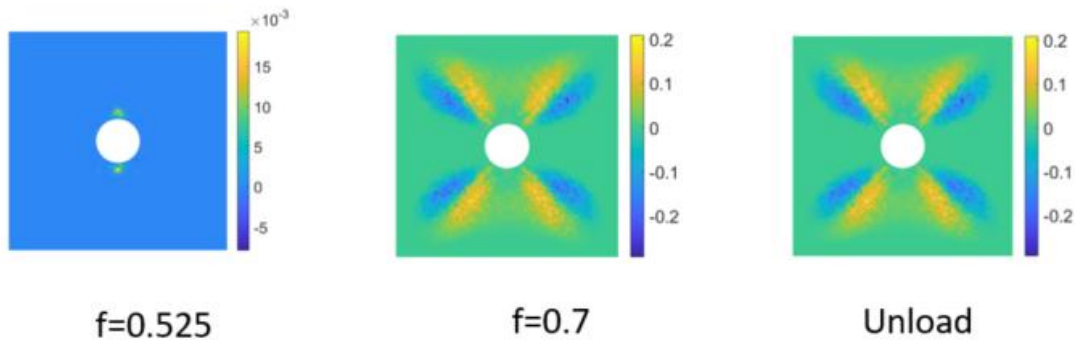


Figure 1 : Incompatible part $F = inc E$ of the strain field E .

We will show how E is defined, therefore how an « incompatible displacement w can be extracted from solving $E = \nabla^s w - F$ where F is the incompatible part of E , and tackle the question of the link between incompatibility maps and the dislocation density.

We then illustrate the choice of kinematic descriptors through analytical or numerical calculations in simple configurations, involving a prescribed dislocation density. In particular, the balance of these quantities associated with a dislocation motion over a given time interval is discussed using a representative example.

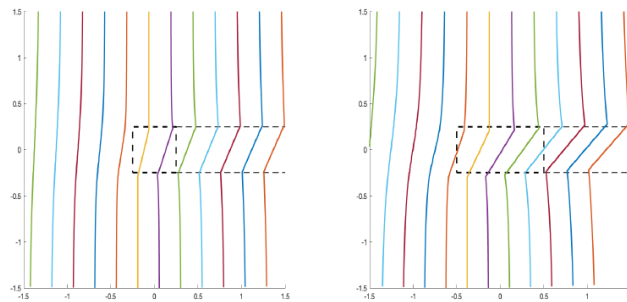


Figure 2 : Effect of a uniform distribution of Volterra dislocations in a square ; E is pure shear.