

**Experimental and Theoretical Studies of Incompatibility and Dislocation Pile-up
Stresses at Grain Boundaries Accounting for Elastic and Plastic Anisotropies**

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Abstract

The mechanical properties of metallic materials strongly depend on the dislocation behavior, such as the density, the distribution, the nucleation and the mobility of dislocations as well as the interactions between dislocations and grain boundaries (GB). The main objective of this thesis is to study the effects of elastic and plastic anisotropies on the dislocation-GB interaction considering complex properties of GBs, misorientation effects and free surfaces effects. To reach this objective, an analytical approach based on the L-E-S formalism was