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Polycrystal Plasticity Simulation of Extrusion of A Magnesium Alloy Round Bar: Effect of Strain Path Non-uniformity

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Abstract

A flow line model is established and combined with the crystal plasticity method to simulate the extrusion process of a magnesium alloy round bar, and investigate the effect of strain path non-uniformity on development of texture and microstructure in extrusion. A parametric flow line model is established to characterize the material flow corresponding to different strain paths in the extrusion chamber. The polycrystal plasticity method coupled with a phenomenological dynamic recrystallization model is employed to analyze the evolution of texture and microstructure accompanying the deformation. The texture of material deformed near the central extrusion area shows the typical ring fiber texture in the (0001) pole figure, while the basal poles of the material deformed in the side areas tend to rotate backward to the extrusion direction, resulting from an increase of the activities of twinning and slip systems. The more

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