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EFFECT OF THE TYPICAL IDEAL ORIENTATIONS ON FORMABILITY ON BCC MATERIALS IN THE BIAXIAL STRETCHING

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Abstract. In this research we analyze forming-limit strains for biaxial stretching of a strain-rate sensitive BCC material using a rate-dependent self-consistent, plasticity, polycrystal (VPSC) model in conjunction with the MK approach. In particular, we addressed the results of Serenelli et.al. [Effect of crystallographic texture on formability on BCC sheet metals. Mecanica Computacional Vol XXVIII, 1077-1087, 2009] who systematically investigated the sensibility of the formability to changes in texture for a BCC steel sheet. We found that forming-limit simulations are not only sensitive to the absolute percentage of a certain texture components, but also to the combination of "orientations pairs". To carry out this study, we assume that the initial thickness of the narrow band is the same as the initial thickness of the rest of the sheet outside the band, and no surface groove is imposed on the sheet. The different orientations between crystal grains inside and outside the band are responsible for the initial formation of the band and its subsequent deterioration into localized. The simulated FLDs show large differences when all combinations of the typical-texture components are considered. We believe that a more comprehensive description of the FLD can be obtained when the probability of the occurrence of the "orientations pairs" is also known. We took information about the occurrence of the "texture-components pairs" analyzing an interstitial free steel sheet. The IF FLD profile was analyzed in terms of the combination of the specified preferred orientations ({001}<110>, {112}<110>, {111}<110>, {111}<112>, {554}<225>).