

عنوان مقاله:

An anisotropic axisymmetric model for wrought magnesium alloys

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خلاصه مقاله:

The global environmental concerns have put the light weighting of structures on the fore front of the research in transportation industry. Among other light weight alloys, the transportation industry is considering magnesium intensive light body-in-white structure in automotive applications. Although the research in modeling technique areas is very active, a suitable practical model mimicking the severe asymmetry and anisotropy of magnesium is lacking. Loading-unloading behavior of wrought magnesium alloy over a wide range of strain has been obtained experimentally and is presented here. It is shown that while the material behaves elastically isotropic, it shows a different yield in tension and compression with a high Bauschinger effect. This is attributed to the magnesium multiple deformation mechanisms of slip, extension/contraction twinning, and de-twinning resulting in an asymmetric yield and a direction dependent performance. Up-to-date there are no plasticity model commercially available that can capture these behavior. Therefore, it is necessary to develop a simple and efficient model that can serve as benchmarking tool for plasticity models evaluation. Such model is presented in this paper. The axisymmetric elastic-plastic model of Jahed and Dubey (۱۹۹۷) has been extended to wrought magnesium alloys. An asymmetric yield function is adapted and the obtained behavior in loading and unloading is directly incorporated in the solution process. It is shown that the results are significantly different from isotropic assumptions.

کلمات کلیدی:

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