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Application of physical and numerical simulations for interpretation of peripheral coarse grain structure during hot extrusion of AA7020 aluminum alloy

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Abstract

In this research, hot compression test is used to simulate the metallurgical phenomena occurring in the peripheral part of AA7020 aluminum alloy extrudates during hot extrusion and leading to the formation of the peripheral coarse grain (PCG) structure. The temperature profiles at a tracking point in the peripheral part of extrudates are predicted using finite element method (FEM). A special thermal treatment representing the predicted thermal profiles during extrusion is designed and applied to specimens after hot-compression testing. The effects of deformation conditions, i.e., temperature and strain rate, and the subsequent special thermal treatment on the formation of coarse grains in the AA7020 alloy are investigated. The as-deformed microstructures of specimens as well as the microstructures of specimens after the special thermal treatment are examined and the average grain size and homogeneity of grain size

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