DEPENDENCY OF THE DENDRITIC MICROSTRUCTURES ON THE GROWTH RATE IN THE DIRECTIONALLY SOLIDIFIED 7020 ALLOY

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Abstract- 7020 aluminum is a 7000-series aluminum alloy: the main alloying addition is zinc and it is formulated for primary forming into wrought products. 7020 is the Aluminum Association (AA) designation for this material. In European standards, it will typically be given as EN AW-7020. H17 is British Standard designation. The aim of this work is to investigate the relationship between growth rate, V, and dendritic microstructures (primary dendrite arm spacing, λ_1, secondary dendrite arm spacing, λ_2, dendrite tip radius, R and mushy zone depth, d), in the EN AW-7020 alloy (Al- 4.5 wt %Zn- 1.2wt %Mg-0.15 wt %Cr-0.15 wt %Zr) alloy. In order to achieve this aim, the specimens were solidified under argon atmosphere and steady-state conditions upward with different growth rate, V for EN AW-7020 alloy in the Bridgman type directional solidification apparatus. The dendritic microstructures were measured and expressed as functions of growth rate by using linear regression analysis. Theoretical models for the dendrite arm spacings and tip radius have been compared with the experimental observations, and a comparison of our results with the current theoretical models and previous experimental results have also been made.
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Index Terms- 7XXX alloys, directionally solidification, microstructure.