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摩擦条件对铝合金挤压变形流动行为的影响

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摘 要：通过有限元模拟和实验，对不同摩擦挤压过程中铝合金变形流动行为的机理进行分析，并利用罗德系数和应力偏量不变量(J_2)等特征量进行变形分区。结果表明：采用积极摩擦可使挤压时的“死区”缺陷完全消失，且塑性区内材料的应变类型由3种变为均一的拉伸类变化，显著地提高了挤压过程中坯料横断面上金属流速的均匀性，更利于金属的挤出成形。

关键字： 挤压；摩擦条件；数值模拟；应变类型；金属流动行为

Effect of friction condition on flow behavior of aluminum alloys during extrusion

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Abstract: The mechanical mechanism of the flow behavior of aluminum alloys during extrusion process with active friction was investigated by numerical simulations and experiments. The characteristic quantities such as the second invariant of the Lode parameter (μ) and deviatoric stress tensor (J2) were employed for the division of deformation area. The results show that when extruded with active friction, no metal flow interface forms at the container bottom, the dead metal zone completely disappears, the deformation types of the metal in the plastic deformation area change from three types to one type of tension. The homogeneity of the deformation as well as the metal flow is apparently improved, which will be helpful for extruding and promoting the quality of extrudates.

Key words: extrusion; friction condition; numerical simulations; deformation types; metal flow behavior

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