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材料化学工程与纳米技术

带有矩形嵌件薄壁型腔内熔接过程动态模拟

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摘要

为了准确模拟具有对称结构的带有矩形嵌件的薄壁型腔内熔接线的动态形成过程，采用Level Set/Ghost方法追踪充填阶段聚合物熔体前沿界面。引入具有高阶精度且数值稳定无振荡的5WENO（the fifth order weighted essentially nonoscillatory）格式对Level Set/Ghost方程进行数值求解，耦合求解物理量控制方程的一般差分格式实现熔接过程的动态模拟。数值算例对整个流场的压力、温度及速度进行了分析和讨论，并将熔接区域的压力、温度和非熔接区域的压力、温度进行了比较。数值结果与理论分析结果一致，且与前人数值结果相比有很好的精度。

关键词

熔接线 Level Set/Ghost方法 Hele-Shaw模型 WENO格式

分类号

Dynamic simulation for weldlines in thin mold with rectangle cylinder

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Abstract

The Level Set/Ghost method was introduced to dynamically simulate the weldlines in the symmetric thin mold with rectangle cylinder precisely.The physical controlling equations were discretized by the general finite difference schemes，and the 5WENO（the fifth order weighted essentially nonoscillatory）scheme was implemented for the Level Set/Ghost equations.And then weldlines were captured accurately.Moreover，the analysis was made on the pressure，temperature and velocity at different times.The results were found to agree reasonably well with the corresponding theoretical analysis and to have higher accuracy than the numerical results of prior researches.

Key words

weldline Level Set/Ghost method Hele-Shaw model WENO scheme

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