

圆弧刃刀具微细非自由切削参数建模与预报 Modeling and Prediction of Non-free-cutting Parameters on Micro-cutting with Rounded-edge Tool

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关键词: 微细切削 非自由切削 最小能量耗散 等效切削刃 非自由系数 流屑角

摘要: 非自由切削是影响微细切削加工的重要效应之一。针对微细切削条件下刀具圆弧刃区切削干涉作用显著增强的特点, 通过单元刀具之间切削干涉对切屑流动方向的影响分析, 建立了圆弧刃刀具的排屑方向干涉模型。应用Stabler法则和最小能量耗散原理确定出圆弧刃刀具作纵向进给的切屑流动方向、等效切削刃、流屑角和非自由系数。选取不同进给量和切削深度的组合对以上非自由切削特征参数进行了数值预报, 预报结果可用于微细切削非自由状态的评价和改善, 以及切削用量的合理匹配。 Non-free-cutting is an effect which affects the mechanism of micro cutting greatly. The influence of cutting intervene between elementary cutting tool on chip flow direction was analyzed, and chip flow intervene of the rounded-edge tool was mathematically modeled aims at the increase of cutting intervene caused by chip flow in the rounded-edge of micro cutting tool. Furthermore, chip flow direction, equivalent cutting edge and chip flow angle were deduced with Stabler rule and minimal energy dispersion principle respectively. Those above parameters were numerical predicted under different feed rate and cutting depth, and the prediction results can be used for the evaluation and improvement of micro-cutting status, as well as the optimization of cutting regimes.

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