

An integral algorithm for instantaneous uncut chip thickness measuring in the milling process

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ABSTRACT

Instantaneous uncut chip thickness (IUCT) calculation is an essential work for dynamic cutting force prediction accurately in milling process. This study presents an integral algorithm in polar coordinate system for measuring the thickness of transient uncut chip. The milling trajectory, cycloidal motion, is adopted in the formulation. Both milling continuity and cutter run-out are also considered in this model. The developed model offers a methodology for calculating the IUCT precisely. Furthermore, a series of simulations are carried out under different processing parameters. The results suggest that increasing both the feed per tooth and number of teeth can surge the width of IUCT slightly, but decrease with smaller cutter radius. The milling force simulations are validated by the experiment results measured in the reference and compared with classical approximate method, showing the proposed IUCT model providing good applications in instantaneous milling force predictions.

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