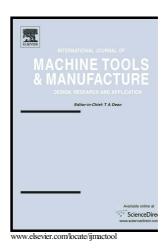
## Author's Accepted Manuscript

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ACCEPTED MANUSCRIPT

A novel approach for the prediction of the milling stability based on the

Simpson method

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Abstract:

In this paper a new approach is presented for predicting the milling stability based on the

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Simpson method. Generally the milling dynamic process is described as a linear time-periodic

system with a single discrete time delay. By dividing the tooth passing period equally into a

finite set of time intervals, the Simpson method is utilized in each time interval to estimate the

state items. Then the state transition matrix over one tooth passing period is constructed, and

the milling stability could be predicted by the Floquet theory. The convergence rate of the

proposed method is discussed, and two benchmark examples are conducted. The results show

that the proposed method achieves satisfactory accuracy and efficiency.

Key words: milling stability; Simpson method; Floquet theory; rate of convergence

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