

Numerical study on stability of composite cutter bar milling system in rotating coordinate frame

Yuhuan Zhang¹, Yongsheng Ren², and Jinfeng Zhang²

¹Shandong University of Technology

²Shandong University of Science and Technology

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Abstract

This paper studies chatter stability of composite cutter bar milling system in rotating coordinate frame. Based on the structural dynamic equation and regenerative milling force model of composite cutter bar in rotating coordinate frame, the continuous distributed chatter analysis model of composite cutter bar milling system is established. The stability of milling system with a rotary symmetric dynamic cutter bar is predicted by using the semi-discrete time domain method. Influences including internal damping, external damping, symmetrical and asymmetric laminates on the stability of milling system are analyzed, and the results obtained in rotating and fixed coordinate frame are compared. It is shown that the results are consistent for symmetrical cutter bar either in the rotating coordinate frame or in the fixed coordinate frame. A new chatter instability zone appears at high rotating speeds due to material internal damping of the rotating composite cutter bar.

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