Numerical solution of a milling model including thermoelastic workpiece effects [1]

Krzysztof Chełminski[2], Dietmar Hömberg[3], and Oliver Rott[3]

[2] Warsaw University of Technology, Faculty of Mathematics and Information Science, pl. Politechniki 1, 00-661 Warsaw, Poland
E-Mail: kchelmin@mini.pw.edu.pl

[3] Weierstrass Institute for Applied Analysis and Stochastics, Mohrenstr. 39, 10117 Berlin, Germany
E-Mail: hoemberg@wias-berlin.de, rott@wias-berlin.de

Abstract

The mathematical modeling of milling processes generally leads to systems of nonautonomous delay differential equations (DDEs). Such models combine an ordinary differential equation (ODE) describing the dynamical characteristics of the milling machine structure with an excitation containing the history of motion. For the sake of simplicity the dynamic properties of the workpiece are often approximated by very rough models or they are completely neglected.
We have therefore developed a new milling model consisting of a standard, simple machine representation and a continuous, thermo - elastic workpiece description. In the first part of the presentation we discuss some modeling aspects emphasizing the coupling of machine, workpiece and process model. We briefly comment on the existence of a unique solution of the coupled equations. Finally, we present a straight forward numerical scheme to solve the system in time domain.

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