15th INTERNATIONAL CONFERENCE
Dynamical Systems — Theory and Applications
December 2-5, 2019. Lodz, POLAND.

DSTA 2019

paper id: EXP215

Optimization of the spindle speed during milling of high-dimensional structures with the use of technique of Experiment-Aided Virtual Prototyping

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Abstract: In the paper are presented considerations concerning vibration suppression problems during milling of large-sized workpieces with the use of innovative method of matching the spindle speed of cutting tool. It depends on repeatable change of the basic value of spindle speed as soon as the optimal vibration state of the workpiece approaches. The values of dominant “peaks” in the frequency spectra and the Root Mean Square (RMS) values of time domain displacements are evaluated. The efficiency of the proposed approach is evidenced by chosen mechatronic design technique, called Experiment-Aided Virtual Prototyping (E-AVP). Thanks to the results of the identification of the modal subsystem obtained by the ERA method, it can be stated that the parameters obtained from the experiment and delivered from the computational model have been correctly determined and constitute reliable process data for the simulation tests.

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