



ME Seminar



Vision-based modal analysis of machine tools

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ABSTRACT

This talk will discuss the use of vision-based methods for machine tool motion registration and modal analysis. Motion of three illustrative tools and one small machine were recorded using low- and high-speed cameras with sufficiently high resolutions. Pixels within images from recordings of the vibrating machine are treated as non-contact motion sensors. The tool's own features are used to register motion using expanded image processing techniques. Motion estimated is governed by the method of motion registration, by the tool's own features, by illumination conditions, noise, and the image acquisition parameters. Extracted motion was benchmarked against twice integrated tool point accelerations, and motion was generally observed to compare well. Modal parameters extracted from vision-based measurements were also observed to agree with those extracted using more traditional experimental modal analysis procedures using a contact type accelerometer as the transducer. Methods discussed are generalized and can suitably be adapted for other applications of interest.

ABOUT THE SPEAKER

Mohit Law is an Assistant Professor in the Department of Mechanical Engineering at the IIT Kanpur. He studied at the University of Pune for his BE, at Michigan Tech for his Masters, and at the University of British Columbia for his PhD. He has worked as a machine tool design engineer at BFW and at the Tata Group, and as a researcher at the Fraunhofer Institute of Machine Tools. At the IIT Kanpur, he teaches and heads the Machine Tool Dynamics Laboratory. His lab works on use-inspired fundamental research related to modelling of machining processes, the dynamics of machining, and the control of machine tool vibrations. For more, please visit: <https://home.iitk.ac.in/~mlaw/>



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