"IDENTIFICATION OF IMPACT FORCES ON A CUTTING TOOL DURING ITS MACHINING OPERATIONS USING INVERSE TECHNIQUES"

A Project Report
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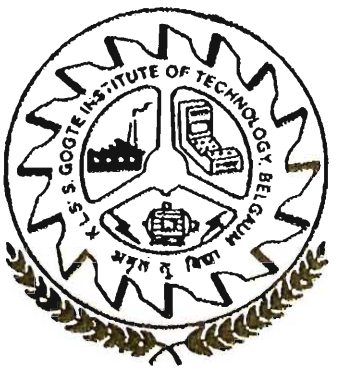

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ABSTRACT

This project represents an overview of study of impact forces acting on a cutting tool. The identification problem of determining the force acting on a structure from measurements of the response of the structure to the force is an inverse problem. Experimental measurement data was used to describe the acceleration response of an impacted cantilever beam. The inverse technique uses these measurements to predict the impact force which resulted in the beam response. This theory then can be extended to predict the impact forces acting on a cutting tool during its operation.

In many practical situations, it is difficult to perform direct measurements of the external forces acting on an existing vibrating structure. Instead, the structure response may then be measured and the position and magnitude of the exciting forces be then calculated from the measured response. Often the results from the inverse process are highly sensitive to noise in the measurements of response and errors in the model of the structure leading to ill conditioning. Here the method of force identification for a cantilever beam subjected to an impact force is adopted. The accelerometer response is used as input for prediction. The force prediction algorithm using inverse finite element method is developed to determine the history of impact force by using the FRF method. Results indicate that general inverse technique can be used to identify unknown forces using response data.

Keywords: *Inverse Problems, Frequency Response Functions, Impact Force, Force Identification, Validation Model, Cutting Tool, Regularization.*