



Stability in the Dynamics of Metal Cutting (Studies in Applied Mechanics)

S.T. Chiriacescu

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Numerous models have been proposed for the study of the dynamic behaviour of cutting tools. An analysis of the main works published over the past 20 years reveal a lack of general methodology in the mathematical modelling of the dynamic cutting process (CP) and in the elastic structure (ES), as well as the absence of efficient and general methods for identifying the conditions under which the amplitudes of the vibration chatter between tool and workpiece can become problematic.

This book provides a thorough review on the mathematical modelling and stability analysis of the dynamic machining system, presenting solutions for the practical problems that can be encountered.

The practical points of the stability and instability of the DMS are discussed, together with various aspects of the modelling and identification of the CP and ES systems. The latest findings are examined in the context of a general study using matrix equations. Such a study on the matrix method is timely in view of the rapid spread in the use of mini and micro-computers.

Based on the matrix equations of the CP and ES systems, the general equations of the DMS with time-invariant parameters are established, and various procedures for the actual stability analysis of this system are presented. Many examples are accompanied by illustrations which also provide adequate practical instructions for other problems in the stability analysis of the DMS. The last part of the book deals with the modelling and stability analysis of the DMS with time-varying parameters, random parameters and random input.

The work is addressed primarily to those interested in the design and exploitation of machine tools in both industry and research. It will also be of interest to applied mathematicians, and can be used as a reference book for advanced courses in mechanical engineering.

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