Dr. Imtiaz Haque
Mechanical & Manufacturing Systems

Chair & Professor

PhD, Clemson Univ, 1982
MS, Clemson Univ, 1977
BS, Pakistan Univ, 1972

Teaching Interests:
dynamics, vibrations, vehicle dynamics

Research Interests:
dynamics and vibrations, modeling/ simulation of vehicle dynamics, multi-body systems, mechanisms and machines, manufacturing processes

Imtiaz Haque has been with the Department since 1982. His teaching and research interests lie in the general areas of dynamics and vibrations of mechanical systems with special emphasis on modeling and simulation of Vehicle Dynamics, Multi-body Systems, Mechanisms and Machines, and Manufacturing Processes. He is a member of the American Society of Mechanical Engineers, Sigma XI, and a senior member of the American Institute of Aeronautics and Astronautics. He has served on the ASME Applied Mechanics Division Transportation Committee and was a founding member of the ASME Materials Division Committee on Metal Forming. He is serving as a Guest Editor for the International Journal of Vehicle Design for 1998-99. Dr. Haque has served as consultant to numerous private and Federal Agencies and in 96-97 spent his sabbatical year at the BMW Research and Engineering Center in Munich, Germany.

Research Topics:

Dynamics of Multi-body Systems: Development of a general algorithmic procedure for automatic dynamic analysis of rigid and flexible mechanical systems (ex. Robots, spacecrafts, automobiles, rail vehicles, motorcycles, space structures, etc.). This involves a number of different projects such as: (1) Development of a hybrid numerical and symbolic multibody code for automatic equation generation and analysis (2) Development of a finite element based recursive algorithm for automatic equation generation. (3) Development of a computer graphics interface for generating inputs to the algorithm and displaying the results.

Dynamics of Mechanisms: Dynamic Stability of Elastic Mechanisms. The equations of motion of an elastic crack slider with joint flexibility contain periodic terms in the mass, stiffness and damping matrices. Previous work in this area has indicated the presence of strange behavior in such mechanisms. It is proposed to study the dynamic behavior of mechanisms with joint flexibility and clearances and identify the various non-linear behaviors present.

Modeling of Manufacturing Processes: Simulation of Material Forming. A finite element computer code called CFORM has been developed to simulate the behavior of metals during forming. Several projects relating to this work are available. These include the application of A.I. methods for mesh generation and refinement, development of graphical user interfaces to facilitate result interpretation, development of robust numerical schemes to overcome difficulties associated with the solution of non-linear algebraic equations etc.

Selected Publications:

Hatman, V., Haque, I., and Bagchi, A., " Dynamics of a Flexible Rotating Beam Undergoing Intermittent Constrained Motion. Part I: Theory, Part II: Numerical Results," Journal of Sound and Vibrations, Vol. 194(5),pp. 653-683, Aug. 1996.

Ahmed, W., Liu, Cheng-yu, and Haque, I., "Steady State Curving Performanceand Stability-Curving Trade-off for High Speed Articulated Train Sets," Journal of CSME Transactions, Vol. 20, No. 4, Dec. 1996.

Cui, Kan and Haque, I. "On Configurations of Symbolic Equations of Motion for Hybrid Multi-Body Systems," Intl. Journal of Mechanisms and Machine Theory, Vol. 32, No. 6, pp. 743-763, 1997.