JOURNAL OF GUIDANCE, CONTROL, AND DYNAMICS
Vol. 24, No. 1, January–February 2001

Benchmark Active Control Technology Special Section: Part III

Introduction

THE Benchmark Active Control Technology (BACT) research project was conducted at NASA Langley Research Center, in collaboration with related research from Duke University, Texas A&M, University of Minnesota, Vanderbilt University, University of Florida, University of Nevada, The Boeing Company (St. Louis), The Boeing Company (Long Beach), and Honeywell. The BACT project tested a standard instrumented wing model with the NACA 0012 airfoil section that was mounted on a pitch and plunge apparatus in the Langley Transonic Dynamics Tunnel, with the objectives to 1) measure and archive unsteady aerodynamics data in the transonic flow regime and 2) study, record, and actively control various critical transonic flutter instability phenomena. This vast collection of benchmark data was used for verification and validation of computational fluid dynamics analyses techniques and robust flutter-suppression control law synthesis methodologies. For flutter suppression control laws, a wide variety of design techniques (e.g., classical, minimax, H-infinity, robust passification, structured singular value, μ-synthesis, and neural network) was used. A set of control laws was implemented digitally and tested for active flutter suppression in the wind tunnel. Eighteen papers that describe this collaborative research are presented in three issues of the *Journal of Guidance, Control, and Dynamics.* We hope that these papers will be of enduring interest to both the fluid mechanics and control communities.

This special section presents the last set of six papers on this subject. The first paper, by Waszak, describes the design of a set of flutter-suppression control laws using the μ-synthesis technique, and presents a comparison of successful test results. These tests demonstrated, perhaps for the first time, the use of a spoiler as a control surface for flutter suppression. The next paper by Haley and Soloway describes a generalized predictive controller design using neural network. The paper by Baker, Roughen, and Fogarty compares computational fluid dynamics and doublet-lattice calculation with the wind-tunnel test data. The scaling issues in an aeroelastic testing are dealt with in the paper by Friedman and Presente. New insights into energy approach in transonic flutter-instability analyses are presented by Bendiksen. In the final paper of this series, Kurdila, Strganac, Junkins, Ko, and Akella, investigate nonlinear control methods for limit-cycle oscillations.

Vivek Mukhopadhyay
Associate Editor