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Aerodynamic Design Optimization by A Continuous Adjoint Method

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Our latest progress on the application of a continuous adjoint method to perform aerodynamic design optimization of wings and turbomachinery blade rows will be presented. This method requires only about twice the computational effort of flow calculation to obtain the complete gradient information at each operating condition, regardless of the number of design parameters. Therefore, it is orders-of-magnitude more efficient than a conventional finite-difference method for obtaining the gradient information in a optimization procedure when the design parameters are in the hundreds and more. Examples of single and multiple-point design of transonic wings and turbomachinery blade rows will be presented.

Feng Liu, Professor of Mechanical and Aerospace Engineering at the University of California, Irvine, USA. He is currently also an adjunt Professor of the College of Engineering of Peking University, Beijing, China. Professor Liu received his Ph.D. (1991) from Princeton University, USA. His research interests include computational fluid dynamics, transonic, reactive, and two-phase flows, turbomachinery aerodynamics, aeroelasticity, and gas-turbine engine cycle innovation. Dr. Liu is a Fellow of the American Institute of Aeronautics and Astronautics (AIAA) and currently serves as the Associate Editor for the AIAA Journal of Propulsion and Power and on the Editorial Board of the International Journal of Computational Fluid Dynamics.
Detailed CV is available at http://fliu.eng.uci.edu

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