

Reconfigurable Vertical Lift

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ABSTRACT

Shape adaptation, morphing and reconfiguration allow an aircraft to perform more optimally in diverse operating conditions. Over the last decade there has been tremendous interest in application of reconfiguration to rotary-wing aircraft. Some of the key morphing technologies such as extension of rotor blade span or rotor blade chord, large change in rotor blade twist or airfoil cross-section, concepts for high-speed, and the impact of these technologies on performance improvement, expansion of operating envelope, and the operational flexibility of the helicopter, will be discussed. Implementing rotor blade morphing is a significant challenge due to space constraints on the rotor blade, transfer of power to the rotating system, as well as operation under large centrifugal loads. A number of implementation methods will be presented, and future directions and opportunities will be discussed.

BIOGRAPHICAL SKETCH

Farhan Gandhi is the Rosalind and John J. Redfern Jr. '33 Endowed Chair in Aerospace Engineering at Rensselaer Polytechnic Institute (RPI) in the US. He is also RPI's Aerospace Program Director, and Director of RPI's Center for Mobility with Vertical Lift (MOVE). His research interest and activities cover the areas of rotorcraft aeromechanics, advanced rotary-wing configurations, multi-rotor aircraft, as well as smart/adaptive structures. Dr. Gandhi has been a visionary on reconfiguration in vertical lift platforms and high-speed rotorcraft and is credited with some of the most significant pioneering work in these areas with support from federal and state agencies as well as industry. He is a Technical Fellow of the American Helicopter Society, winner of the 1998 AHS François Xavier Bagnoud Award and the 2007 Popular Mechanics Breakthrough Award (for morphing rotors). He is a past Chair of the AHS Dynamics and Aircraft Design Technical Committees, and the AHS Education Committee. His research group at RPI comprises eleven PhD students, two post-doctoral research scholars, and a number of undergrad students. Dr. Gandhi is author of over 260 articles appearing in archival journals and technical conference proceedings.