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Vorticity Flux of Low-Speed Flow Over a Deforming Arc Airfoil MAJID MOLKI, NEGIN SATTARI, Southern Illinois University Edwardsville — Vorticity flux generated by a deforming arc airfoil is investigated. The model is based on the finite-volume method for laminar incompressible flow of air over a circular-arc airfoil. A deforming-mesh approach is employed to accommodate the motion and deformation of the airfoil. The vorticity flux is evaluated at the surface of the airfoil for both non-deforming (rigid) and deforming airfoils. Complex flow features such as boundary layer flows, vortical structures, rolling vortices, and vortex layers are all present and have some degree of influence on the aerodynamic characteristics of the airfoil. It is shown that the vorticity flux at the surface is influenced by tangential pressure gradient and tangential acceleration of the airfoil. Since the pressure gradient and acceleration are non-uniform over the airfoil, their contributions strongly depend on position, and they result in a diffused distribution of vorticity flux magnitude over the surface. Vorticity flux into the fluid results in the formation and growth of vortices which are swept with the flow downstream.

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