

Abstract Submitted
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Vortex force map for a smart rotor.¹ JUAN LI, XIAOWEI ZHAO,
Univ of Warwick — The vortex force map method for a single body is extended to multi-body viscous flows and applied to a smart rotor configuration. The flow-independent vortex force maps for each individual part of the smart rotor at different deployments are designed for the purpose of identifying the contribution of a given vortex in the flow field to body force, and defining the positive and negative force-generating critical regions or directions. These vortex force maps combined with the pre-known velocity and vorticity field are used to obtain the unsteady forces acting on each part of the smart rotor starting from rest. The results are compared with those from computational fluid dynamics. It is found that the dominant force is the pressure force. And for the main airfoil and the flap, the force variation against time is closely related to the evolution of the vortex structure near the whole configuration and near the flap, respectively.

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