

Abstract Submitted
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Influence of Ground Effect on Low Aspect Ratio Membrane Wings ROBERT BLEISCHWITZ, PhD-student, ROELAND DE KAT, Research Fellow, BHARATHRAM GANAPATHISUBRAMANI, Professor, University of Southampton — Inspired by the current interest of membrane wings for Micro Air Vehicles (*MAVs*) and hard limits in aerodynamic performance for wings in moderate Reynolds number regimes, an experimental wind tunnel study is conducted at a Reynolds number of approximately 65,000 to determine the aeromechanics of flexible, low aspect ratio (AR) membrane wings ($AR \leq 2$) in the vicinity of the ground. Pitch angle α and height over ground h/c is varied with a traverse system. Flexible membrane wings are compared with rigid flat plates. A rolling road is used to impose the ground effect and the boundary layer leading up to the road is removed using a suction system. Time-averaged lift, drag and pitch moment changes are captured with a 6-axis force transducer and its effects are interpreted in terms of the membrane motions obtained using Direct-Image-Correlation (*DIC*) technique. Flow-structure-ground interactions are examined and the membrane dynamics are compared to results obtained outside of ground effect. Ultimately, understanding the ground effect on flexible membrane wings at moderate Reynolds numbers could help to design Wing-in-Ground *MAVs* with extended range and reduced energy consumption.

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