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A Galloping Energy Harvester with Attached Flow PETR DENISSENKO, IGOR KHOVANOV, SAM TUCKER-HARVEY, University of Warwick — Aeroelastic energy harvesters are a promising technology for the operation of wireless sensors and microelectromechanical systems, as well as providing the possibility of harvesting wind energy in applications were conventional wind turbines are ineffective, such as in highly turbulent flows, or unreliable, such as in harsh environmental conditions. The development of aeroelastic energy harvesters to date has focused on the flutter of airfoils, the galloping of prismatic structures, and the vortex induced vibrations. We present a novel type of galloping energy harvester with the flow becoming attached when the oscillation amplitude is high enough. With the flow attached, the harvester blade acts closer to an aerofoil than a bluff body, which results in a higher efficiency. The dynamics of a prototype device has been characterised experimentally with the use of a motion tracking system. The flow structure in the vicinity of the device has been studied using smoke visualisation and PIV measurements. A lumped parameter mathematical model has been developed and related to the experimental results.

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