Energy Extraction from a Galloping Prism

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The present study considers energy extraction from the flow induced vibrations of a triangular cylinder flexibly mounted in flow, which previous work has shown can resonate with an amplitude of up to four cylinder diameters. The galloping phenomenon, a dynamic instability characterized by large amplitude, low frequency oscillations, is well suited for energy harvesting from the flow but is largely unstudied. Energy harvesting is achieved by mechanically linking the linearly oscillating prism to a rotational generator. By prescribing a set angular amplitude on the rotational linkage, different vortex shedding regimes can be harnessed to result in either an AC or DC voltage signal from the generator, increasing the efficiency of extraction from the swept volume of flow. From previous testing, improvements have been made to the setup by 3D printing parts, which has resulted in increased efficiencies in the system which range between %0.003 and %1.917. Thus, this novel type of generator is well suited for powering low-draw remote sensors otherwise without power routing, such as placed on the subsea moorings of floating offshore wind turbines.