Abstract Submitted
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Vortex-Induced Vibration (VIV) Reduction Properties of Seal Whisker-Like Geometries[1] HENDRIK HANS, Nanyang Technological University, Singapore-MIT Alliance for Research and Technology, JIANMIN MIAO, Nanyang Technological University, MICHAEL TRIANTAFYLLOU, Massachusetts Institute of Technology — Biological studies have shown that harbor seal whiskers are capable of reducing Vortex-Induced Vibrations (VIV). As the whiskers have convoluted geometry, it is necessary to evaluate the parameters that define their VIV reduction properties. Whisker-Like Geometries (WLGs) consisting of all but one feature on the true whisker geometry are designed. Comparison of VIV on these WLGs with VIV on circular and elliptical cylinders at Re = 500 is performed. Three-dimensional simulations of flow past these geometries, which are allowed to freely vibrate in crossflow, are performed with the Implicit Large Eddy Simulation as the turbulence model. The results indicate that the existence of axial undulations is the most dominant feature that affects the VIV reduction. The smallest VIV is observed on WLGs with dual-axial undulations and the largest VIV is observed on the circular cylinder. Variations in the features of the WLGs result in noticeable changes in their VIV. The circular cylinder is observed to response as a steady system while the WLGs with dual-axial undulations are observed to respond as a chaotic system. The response of WLGs with single-axial undulations is found to depend on their detailed features.

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