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Flow-Induced Flutter of Multi-Inverted Flag Configurations: Vortex Dynamics and Flutter Behaviors[1] AARON RIPS, KOUROSH SHOELE, RAJAT MITTAL, Johns Hopkins University — Flow-induced flutter of "inverted" flags has potential application in energy-harvesting, enhanced mixing and heat transfer enhancement. While a number of previous studies have explored the dynamics of single inverted flags, the current study examines the issue of the coupled dynamics of multi-inverted flag configurations. The primary configurations investigated here have two inverted filaments in either side-by-side or tandem formations. The flapping behavior, dynamics, and flow-structure interaction of each filament as well as the synchronization between the dynamics of the filaments was studied. The investigation of the tandem configuration shows coupling of the flapping dynamics for a variety of separations as well as the ability of the trailing filament to drive the behavior of the leading filament. The behavior of the side-by-side configuration suggests the flapping dynamics in this configuration is dominated by the vortex shedding at the fixed trailing edges. The side-by-side configuration also exhibits multiple distinctive flutter behavior regimes depending on separation distance. Finally, simulations of flag formations with >2 flags are also explored. Implication of the findings on energy-harvesting applications is discussed.

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