Numerical Analysis of the Flow Characteristics Around a Deformable Vortex Generator

Authors : Aimad Koulali

Abstract : Flow structure evolution around a single pair of Delta vortex generators (VGs) is studied numerically. For laminar, transient, and turbulent flow regimes, numerical simulations have been performed in a duct with a pair of Delta vortex generators. The finiteelementmethodwasused to simulate the flow. To formulate the fluid structure interaction problem, the ALE formulation was used. The aim of this study is to provide a detailed insight into the generation and dissipation of longitudinal vortices over a wide range of flow regimes, including the laminar-turbulent transition. A wide range of parameters has been exploited to describe the inducedphenomenawithin the flow. Weexaminedvariousparametersdepending on the VG geometry, the flow regime, and the channel geometry. A detailed analysis of the turbulence and wall shear stress properties has been evaluated. The results affirm that there are still optimal values to obtain better performing vortices in order to improve the exchange performance.