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Turbulent statistics in subsonic and transonic open channel flow with a contraction VENKATESH PULLETIKURTHI, Purdue University, JOEL REDMOND, HySonic Technologies, Purdue University, CARLO SCALO, LUCIANO CASTILLO, Purdue University — In this study, we have simulated an open channel flow at bulk Reynolds numbers of $11,000$ with a sinusoidal contraction to locally yield favorable-pressure-gradient (FPG), zero-pressure gradient (ZPG) and adverse-pressure-gradient (APG) effects, and investigate the effects of the resulting flow separation on the near-wall turbulent structure. Conditions up to transonic Mach numbers are considered to assess compressibility effects on the turbulent flow separation and reattachment. The adopted direct numerical simulations (DNS) framework relies on a block-spectral high-order unstructured code, H^3AMR. The dependency on the streamwise domain length is assessed as well as the effects on mesh resolution via a combined h- and p-refinement grid sensitivity analysis.

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