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Effect of low freestream turbulence on crossflow instabiltiy MOHAMMAD HOSSEINI, KTH Royal Institute of Technology, Department of Mechanics, Linné Flow Centre, SeRC, SE-10044 Stockholm, Sweden, ARDESHIR HANIFI, KTH Royal Institute of Technology, Dept of Mechanics, Linné Flow Centre, SeRC, SE-10044 Stockholm, Sweden, Swedish Defense Research Agency, FOI, DAN HENNINGSON, KTH Royal Institute of Technology, Department of Mechanics, Linné Flow Centre, SeRC, SE-10044 Stockholm, Sweden — The effect of freestream turbulence on the generation of crossflow disturbances in swept wings is investigated through direct numerical simulations. The set up follows the experimental set up provided by Hunt *et al.*[1] in their TAMU experiment. In this experiment the authors use ASU(67)-0315 wing geometry which promotes growth of crossflow disturbances. In this study, we fully reproduce the freestream isotropic homogenous turbulence through a DNS code using detailed freestream spectrum data provided by the experiment. The generated freestream fields are then applied as the inflow boundary condition for direct numerical simulation of the wing. The geometrical set up follows the experiment along with application of distributed roughness elements near the leading edge to precipitate stationary crossflow disturbances. Two different levels of freestream turbulence intensities are produced in order to study their effects on the initial amplitudes of the boundary layer perturbations. Additionally their influence on the transition location is examined.

[1]Hunt, L. E. 2011 Boundary-layer receptivity to three-dimensional roughness arrays on a swept-wing. PhD thesis, Texas A&M University.

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