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Direct Numerical Simulations (DNS) of the thermal field in a turbulent channel flow with spanwise sinusoidal blowing/suction CAN LIU, GUILLERMO ARAYA, LUCIANO CASTILLO, Department of Mechanical Engineering, Texas Tech University, STEFANO LEONARDI, Mechanical Engineering Department, University of Puerto Rico at Mayagüez — Direct Numerical Simulations (DNS) of an incompressible turbulent channel flow with given local perturbations at the walls are performed. Steady blowing and suction are applied at both walls by means of five spanwise holes. The sinusoidal perturbing velocity is considered at several amplitudes (0.025, 0.1 and 0.2 based on the centerline velocity) as well as at two different angles (30 and 40 degrees with respect to the flow direction) in order to explore its effects on the adiabatic efficiency. The Reynolds number of the unperturbed case is Re = 394 and the molecular Prandtl number is Pr = 0.71. Isoflux conditions are assumed for the lower and the upper walls. Furthermore, turbulence statistics, energy budgets and energy spectra are going to be examined for the velocity and thermal fields.

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