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Active control of turbulent heat transfer by local forcing: an energy assessment GUILLERMO ARAYA, Rensselaer Polytechnic Institute, STEFANO LEONARDI, University of Puerto Rico at Mayaguez, LUCIANO CASTILLO, Rensselaer Polytechnic Institute — The influence of local forcing on a turbulent channel flow is numerically investigated. The high level of information provided by Direct Numerical Simulations (DNS) allows an exhaustive analysis of the physical mechanism responsible for heat transfer enhancement. Budgets and energy spectra of the velocity and temperature correlations are computed at several forcing frequencies and compared with the unperturbed channel results. A maximum local skin friction reduction of approximately 32% together with local increases of molecular heat fluxes up to 50% are accomplished at a dimensionless frequency of 0.64 in the vicinity of the forcing source. Furthermore, wall-normal turbulent heat fluxes experience a significant augmentation of approximately 21% at this forcing frequency.

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