Wall-modeled LES of rough-wall flows using the amplitude modulation framework SICONG WU, University of Illinois at Urbana-Champaign, KENNETH CHRISTENSEN, University of Notre Dame, PAUL FISCHER, University of Illinois at Urbana-Champaign, CARLOS PANTANO, University of Southern California — The framework of amplitude modulation (AM) is ideally suited for the wall-modeled LES of turbulent boundary layer flows since the only model input is the large-scale flow information in the outer resolved region by LES. Adapted from the predictive models pioneered by Mathis et al. (2011) and Mathis et al. (2013), wall-boundary conditions (velocities and wall shear stresses) at the first wall-normal grid point maintained in the log region are proposed for turbulent flow over rough walls, where the model coefficients are calibrated from available DNS and experiments and the universal signals are generated using synthetic turbulence of specified energy spectrum and Reynolds stresses. Statistics including the mean velocity, turbulent stresses and dissipation will be collected and compared to the reference data.

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