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A Spectral-Scaling Based Extension to the Attached Eddy Model of Wall-Turbulence DILEEP CHANDRAN, JASON MONTY, IVAN MARUSIC, The University of Melbourne — An extension to the attached eddy model (AEM) for the logarithmic region of turbulent boundary layers is presented here. The extension is driven by the scaling of two-dimensional (2-D) spectra of the streamwise velocity component, measured at friction Reynolds numbers ranging from 2400 to 26000. The conventional AEM assumes the boundary layer to be populated with hierarchies of self-similar wall-attached ($Type\,A$) eddies alone. While $Type\,A$ eddies represent the dominant energetic large-scale motions at high Reynolds numbers, the scales that are not represented by such eddies are observed to carry a significant proportion of the total kinetic energy. Therefore, in the present study, we propose an extended AEM that incorporate two additional representative eddies. These eddies, named $Type\,C_A$ and $Type\,SS$, represent the self-similar but wall-detached low-Reynolds number features, and the non-self-similar wall-attached superstructures, respectively. The extended AEM is observed to predict reasonably well a greater range of energetic length scales and capture the low- and high-Reynolds number scaling trends in the 2-D spectra of all three velocity components.

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