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**Polynomial Interpolation of $12^{th}$-Order Combined Compact Difference Schemes onto Non-Uniform Grids in Numerical Simulations of Boundary Layer Turbulence Transition** J.C. CHEN, WEIJIA CHEN, Nanyang Technological University — Numerical simulations of boundary layer turbulence transition meet with the challenge of astronomical computational demands needed to visualize the underlying physical phenomena. Reprieve from the onerous computational load avails when recognizing that boundary layer turbulent flow structures intermittently concentrate near the wall region. Astute implementation of non-uniform computational grids with microscopically precise resolution near the wall boundary that tapers off away from the wall offers potential for vast computational efficiency. Importantly, the numerical method applied on non-uniform grids must further consider the issue of numerical stability of the numerical schemes at the wall. Implementation of a piece- wise non-uniform grid accounts for both the numerical demands of realizing turbulent flow structures near the wall and maintaining numerical stability of the wall boundary schemes. Customization of a $12^{th}$ order Combined Compact Difference Scheme with $10^{th}$ and $11^{th}$ order boundary schemes to the non-uniform grid by polynomial interpolation enhances the numerical accuracy near the wall over the use of coordinate transformation. Analyses of the eigenvalue spectrum and modified wave number intimate the stability of the numerical method.

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