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Detailed Simulations of Incident Shock Wave Development and Boundary Layer Growth in Shock Tube Facilities YONG SUN, MATTHIAS IHME, University of Michigan, RALF DEITERDING, Oak Ridge National Laboratory Oak Ridge — The boundary layer growth after the incident shock in shock-tube systems results in the attenuation of the incident shock, which leads to uncertainties in measurements. Apart from few computational investigations, the current understanding about the boundary layer dynamics in shock tubes is largely derived from asymptotic analysis. To address this, detailed numerical simulations in realistic shock-tube systems at relevant operating conditions were conducted to quantify direct contributions of the boundary layer development on the incident shock wave and resulting deviations from ideal shock tube conditions. Both 3D results in cylindrical coordinates and 2D axis-symmetry results were compared with theoretical formulations for boundary layer developments. From this study, detailed characterization of boundary layer growth in realistic shock tube systems was obtained to validate potential models.

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