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Numerical Study of Density Fluctuation in Supersonic Boundary Layer Using RANS

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The variance of density fluctuation is essential for optical degradation prediction in supersonic boundary layer. It can be obtained using Reynolds-averaged equations combined with a density fluctuation model. In this paper, the density fluctuation in supersonic boundary layer is calculated using "mixing length model" (AIAA 92-2794), "AMS model" (AIAA 96-0427) and "g law equation" (AIAA 2005-4779) separately, and the results from these models are compared with DNS result. It is shown that, after modification of model coefficients, the density fluctuation calculated by "AMS model" and "g law equation" agrees well with the DNS data.

Keywords: Computational method, Supersonic boundary layer, Turbulent flow, Density fluctuation