Integral Methods for Validating RANS Models DANIEL ISRAEL,
Los Alamos National Laboratory — Reynolds-averaged Navier-Stokes (RANS) models typically include multiple closure coefficients which are tuned by comparison to experimental data. For self-similar flows, this process can be simplified by examining similarity solutions of the RANS equations. A further simplification is to use approximate profiles inserted into the similarity equations. However, for problems without an asymptotic self-similar state, or for which we are interested in the initial transient response, these techniques cannot be used, leaving a tedious and computationally expensive parameter search through solutions of the original multidimensional flow problem. Classical integral methods provide a convenient alternative approach. Substituting a guessed approximate profile into the RANS equations directly, and integrating across the layer, yields ordinary differential equations for the integral properties of the profile. These simpler equations can be used to examine the behavior of the flow in various regimes and the effects of different parameter settings.

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