Can turbulence closure models come with error bars or uncertainty bounds? SHARATH GIRIMAJI, Texas A&M University — The inherent complexity of turbulence – chaotic and intermittent character – may render many of the conventional uncertainty quantification norms and procedures ineffective for error assessment in closure models. A concerted alliance between turbulence physics and statistical characterization is imperative to make fundamental progress. In this presentation we first identify the most important sources of uncertainties in turbulence closure modeling and classify them into aleatoric (statistical) and epistemic (systematic) categories in the context of one-point closures. Then we propose a framework for exploiting the closure modeling knowledgebase accumulated over the last several decades and channeling the physical understanding for the purpose of uncertainty quantification. In the long run, such development is critical for the progression of turbulence CFD calculation from "post-dictive" nature to high-confidence predictive tools.

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