On Further Enhancement of CFD Predictive Algorithms Based on Evidence Theory SVETLANA POROSEVA, M. YOUSUFF HUSSAINI, Florida State University — The Dempster-Shafer theory of evidence provides two basic tools – i) belief functions that represent the degree of belief (confidence) in a given proposition on the basis of given evidence, and ii) Dempster's rule for combining the belief functions generated by different sources in relation to the same proposition. Previously, we have shown that these tools can be used effectively in application to various CFD problems (subsonic flow around the RAE 2822 airfoil and hurricane/typhoon track forecasts). The current study focuses on further enhancement of the predictive algorithms employing Dempster's rule. Specifically, we analyze one of the requirements of Dempster's rule that belief functions corresponding to different sources should be constructed using independent evidence. In CFD problems, evidence is experimental/observational data, which can be quite limited in number and barely sufficient to construct a single belief function. Application of Dempster's rule requires a minimum of two belief functions. We examine the origin of the requirement that independent data be used to construct belief functions and consider a strategy to overcome this constraint and its implications.

M. Yousuff Hussaini
Florida State University

Date submitted: 27 Jul 2006   Electronic form version 1.4