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Theoretical Fluid Mechanics

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This special section includes four papers originally presented at the 5th AIAA Theoretical Fluid Mechanics Conference (June 2008, Seattle, WA). The papers were included in the Memorial Session for Dr. Norman D. Malmuth, who passed away on 3 July 2007.

It is recognized that contemporary problems in fluid mechanics and aerodynamics require an integrated approach that includes fundamental theoretical studies, massive numerical computations, and detailed experimental investigations. This triad approach has been formulated and actively promoted during recent years by the AIAA Fluid Dynamics Technical Committee. Dr. Malmuth was an active member of the Committee, and he strongly supported the concept. His own research was an excellent example of the triad approach. An outline of the role of theoretical studies can be found his lecture [1] presented at the 4th AIAA Theoretical Fluids Mechanics Conference (June 2005, Toronto, Canada).

The papers included in the present section serve as a further illustration of how theoretical modeling and insights can be integrated with numerical simulations and experimental studies to significantly improve the understanding of complex problems in modern fluid mechanics. They support Dr. Malmuth's statement [1]: "Theoretical modeling is an indispensable tool to the engineer and scientist in addition to current emphasis on familiarity and use of legacy codes as well as development of new ones. It still is a very important skill to know how to set up problems from first principles and make approximations as well as combine this capability with modern computational methods."

Anatoli Tumin
Zvi Rusak
Alexander Fedorov

[1] Malmuth, N., "Theoretical Aerodynamics in Today's Real World: Opportunities and Challenges," *AIAA Journal*, Vol. 44, No. 7, 2006, pp. 1377–1392.
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