

## Robert E. Melnik

### Education

BS, Aeronautical Eng., Polytechnic Institute of Brooklyn, NYC, NY 1956  
MS, Aeronautical Eng., Polytechnic Institute of Brooklyn, NYC, NY 1961  
PhD, Astronautics, Polytechnic Institute of Brooklyn, NYC, NY 1965  
Completed Management Programs at the University of Virginia and the University of Michigan, 1992, 1993

### Employment

**Research Professor**, SimCenter: National Center for Computational Engineering, University of Tennessee at Chattanooga, 2002-Present  
**Professor**, Computational Engineering, Engineering Research Center, Mississippi State University, 1997-2002  
**Research Professor**, Research Initiatives, Computational Simulation and Design Center, Mississippi State University, 2001-2002  
**MSRC Technologist**, Programming Environment and Training (PET) program, DoD Major Shared Research Center, Stennis Space Center, in association with the Engineering Research Center, Mississippi State University, 1997-2001  
**Technical Manager**, Multidisciplinary Analysis and Design Project, Northrop Grumman, Advanced Technology and Development Center, 1995-1997  
**Grumman Research Fellow**, Grumman, Corporate Research Center, 1989-1994  
**Director**, Fluid Mechanics, Grumman, Corporate Research Center, 1981-1989  
**Director**, Aerophysics, Grumman, Corporate Research Center, 1973-1981  
**Head**, Aerodynamics Group, Grumman, Corporate Research Group, 1966-1973  
**Research Scientist**, Grumman, Corporate Research Group, 1956-1966

### Academic Specialties

Fluid Dynamics  
Applied Mathematics  
Computational Fluid Dynamics  
Turbulent Flow  
Aquatic Animal Propulsion

### Professional Activities and Honors

AIAA, Fellow  
Member American Physical Society, Member  
AIAA Technical Committee for Fluid Dynamics, Former Member  
AIAA Journal, Associate Editor, 1978-1980  
Annual Reviews of Fluid Mechanics, Member Editorial Committee  
International Journal of Computational Fluid Dynamics, Member of the Editorial Board  
NASA Steering Committee for the Numerical Aerodynamic Simulation (NAS) Program, Member  
National Academy of Sciences NRC Committee to assess current capabilities and future directions of Computational Fluid Dynamics, Member  
National Research Council Committee to Study Future Ground Test and Computational Requirements for the Arnold Engineering Development Center, Member  
Advisory Board for the ARPA Subtech Program, Member

NASA Steering Committee for the Numerical Aerodynamics Simulation Program (NAS), Member  
Advisory Committee for NASA Center for Turbulence Research, Member  
NASA Turbulence Program Review Committee, Member  
Numerous NASA Peer Review Committees, Member  
Advisory Board of the Cornell University Sibley School of Mechanical and Aerospace Engineering, Member  
Advisory Board SUNY-Stony Brook Department of Applied Mathematics and Statistics, Member  
Executive Advisory Board for the U.S. Army ARO Center of Excellence in Mathematical Sciences at Cornell/SUNY-Stony Brook, Member  
Listed in American Men and Women of Science and Who's Who in America

## Selected Publications

1. "Shock Layer Structure and Entropy Layers in Hypersonic Conical Flows," Progress in Astronautics, Vol 7 (Hypersonic Flow Research), Academic Press, New York, 1962 (coauthor).
2. "A Conical Thin Shock Layer Theory Uniformly Valid in the Entropy Layer," FDL-TDR-64-82, Jan 1965.
3. "Newtonian Entropy Layer in the Vicinity of a Conical Symmetry Plane," AIAA J, Vol 3, March 1965.
4. "A Systematic Study of Some Singular Conical Flow Problems," PhD Dissertation, Polytechnic Institute of Brooklyn, June 1965.
5. "Vortical Singularities in Conical Flow," AIAA Paper No. 66.491 (preprint), 4th Aerospace Sciences Meeting, Los Angeles, CA, 27-29 June 1966; also published in AIAA J, Vol 5, No. 3, April 1967.
6. "Vortical Layers in Supersonic Conical Flow," Grumman Research Department Report RE-323J, March 1968; also presented at AGARD Meeting on "Hypersonic Boundary Layers and Flow Fields," London, England, 1-3 May 1968; AGARD CP No. 30, May 1968.
7. "Subcritical Flows Over Two Dimensional Airfoils by a Multi-strip Method of Integral Relations," presented at the Second International Conference on Numerical Methods in Fluid Dynamics, Berkeley, CA, 15-19 Sept 1970, Springer Verlag; also Grumman Research Department Report RE-393J, Oct 1970 (coauthor).
8. "Shock Wave Strength for Separation of a Laminar Boundary Layer at Transonic Speeds," AIAA J, Vol 9, No. 6, June 1971 (coauthor).
9. "On Viscous and Wind Tunnel Wall Effects in Transonic Flows Over Airfoils," presented AIAA 6th Fluid and Plasma Dynamics Conference, AIAA Paper No. 73-660, July 1973; also Grumman Research Department Report RE-459J (coauthor).
10. "Some Preliminary Results of the Numerical Computation of Two Classes of Transonic Interaction Problems," Grumman Research Department Memorandum RM-577, Aug 1973 (coauthor).
11. "Analysis of the Interaction of a Weak Normal Shock Wave with a Turbulent Boundary Layer," presented AIAA 7th Fluid and Plasma Dynamics Conference, AIAA Paper No. 74-598; also Grumman Research Department Report RE-493J, June 1974 (coauthor).
12. "The Numerical Computation of the Transonic Flow Over Afterbodies Including the Effect of Jet Plume and Viscous Interactions," presented AIAA 13th Aerospace Sciences Meeting, AIAA Paper No. 75-62; also Grumman Research Department Report RE-494J, Jan 1975 (coauthor).
13. "Asymptotic Theory of Two Dimensional Trailing Edge Flows," paper Aerodynamic Analysis Requiring Advanced Computers, NASA SP-347, March 1975 (coauthor).
14. "Further Developments in an Analysis of the Interaction of a Weak Normal Shock Wave with a Turbulent Boundary Layer," Symposium Transsonicum II, eds, K. Oswatitsch and D. Rues, Springer-Verlag, Sept 1975 (coauthor).
15. "Numerical Solutions of the Triple Deck Equations for Laminar Trailing Edge Stall," Proc 5th International Conference on Numerical Methods in Fluid Dynamics, Springer-Verlag, 1976 (coauthor).
16. "The Numerical Computations of the Transonic Flow Over Two Element Airfoil Systems," Proc 5th International Conference on Numerical Methods in Fluid Dynamics, Springer-Verlag, 1976 (coauthor).
17. "The Leading Edge Singularity in Transonic Small-Disturbance Theory," Grumman Research Department Report RE-525, Oct 1976 (coauthor).
18. "Wake Curvature and Trailing Edge Interaction Effects in Viscous Flow Over Airfoils" published in Advanced Technology Airfoil Research, Vol. 1, NASA Conference Publication 2045, 1979.
19. "Interactions of Normal Shock Waves with Turbulent Boundary Layers at Transonic Speeds" published in Transonic Flow Problems in Turbo Machinery ed. by T. C. Adamson Jr., Hemisphere Publishing Co., 1977.
20. "An Analysis of the Leading Edge Singularity in Transonic Small Disturbance Theory" Quarterly Journal of Mechanics and Applied Mathematics, Vol. XXX1, 1978, (coauthor).
21. "Leading Edge Singularity in Transonic Small Disturbance Theory: Numerical Resolution" AIAA Journal Vol. 17, No. 3, March, 1979.

22. "Transonic Viscous Interaction," Lectures presented in AIAA Professional Study Series, Snowmass, CO, July 1980.
23. "Turbulent Interactions on Airfoils at Transonic Speeds - Recent Developments," Computation of Viscous-Inviscid Interactions, Colorado Springs, Colorado AGARD CP 291, 29 Sept. 1980.
24. "Flow 0862 - Transonic Airfoils," Data Evaluation Presented at 1980-81 AFOSR-HTTM- Stanford Conference on Complex Turbulence Flows, Palo Alto, CA, Sept 1980.
25. "Mass Flux Boundary Conditions in Linear Theory" AIAA Journal, Vol. 22, Nov. 1984 (coauthor).
26. "On the Turbulent Viscid - Inviscid Interaction at a Wedge Shaped Trailing Edge," presented at the Symposium on Numerical and Physical Aspects of Aerodynamic Flows, California State University, Long Beach, CA, 19-21 Jan 1981 (coauthor). Published by Springer Verlag 1982.
27. "The Role of Constraints in the Inverse Design Problem for Transonic Airfoils," AIAA Journal, Vol. 22, December 1984 (coauthor).
28. "A Multi-Grid Method for the Computation of Viscid/Inviscid Interaction on Airfoils", AIAA Paper No. 83-0234, AIAA 21st Aerospace Sciences Meeting, Reno, Nevada, Jan. 1983 (coauthor).
29. "Asymptotic Theory of Turbulent Wall Jets", Paper presented at the Second Symposium on Numerical and Physical Aspects of Aerodynamic Flows, California State University, Long Beach, CA, Jan. 19-21, 1983. Also Office of Naval Research Technical Report RE-654J, (coauthor).
30. "The Design of Transonic Airfoils by a Well-Posed inverse Method," International Conference on Inverse Design Concepts in Engineering Sciences, Austin, Texas, 12-18 October 1984 (coauthor).
31. "The Computation of Viscid/Inviscid Interaction on Airfoils with Separated Flow," Third Symposium on the Numerical and Physical Aspects of Aerodynamic Flows, California State University, Long Beach, CA, 21-24 January 1985.
32. "Similarity Solutions for Plane and Radial Jets Using a k-e Turbulence Model" Trans. ASMC Journal of **Fluids Engineering, Vol. 107, No. 1 March 12, 1985, (coauthor).**
33. "A Method for Design of Closed Airfoils for Arbitrary Supercritical Speed Distributions" AIAA paper No. 85-5023, AIAA 3rd Applied Aerodynamics Conference, 14-16 October 1985, (coauthor).
34. "An Improved Viscid/Inviscid Interaction Procedure for Transonic Flow Over Airfoils" NASA Contract Report 3805, October 1985, (coauthor).
35. "Grumfoil: A Computer Code for the Viscous Transonic Flow Over Airfoils" NASA Contractor Report B806, October 1985, (coauthor).
36. "Computation of Turbulent Separated Flow with an Integral Boundary Layer Method," paper presented at the 10th International Conference on Numerical Methods in Fluid Dynamics, Beijing, China, 23-25 June 1986, published in Lecture Notes in Physics, 264, Springer Verlag, 1986 (coauthor).
37. "A New Asymptotic Theory of Turbulent Boundary Layers and Its Application to Separation" Boundary Layer Separation, Springer Verlag, New York, 1987
38. "An Overview of Computational Fluid Dynamics Development and Application at Grumman," presented at the NASA Conference on Supercomputing in Aerospace, 10-12 March 1987.
39. "An Asymptotic Theory of Turbulent of Turbulent Separation", Computers and Fluids, Vol.17, 1989
40. "Some Applications of Asymptotic Theory to Turbulent Flow" presented at the 29th Aerospace Sciences Meeting, Reno, Nevada, AIAA Paper No. 91-0220, January, 1991
41. "Navier-Stokes Computations of Turbulent Flows Using a New Wall Boundary Condition" presented at the 4th International Symposium on Computational Fluid Dynamics at the University of California at Davis,
42. "Applications of a new Wall-Slip Boundary Condition to the computation of Turbulent Flows" presented at the AIAA 24th Fluid Dynamics Conference, Orlando, Fl, AIAA paper No. 93-3108, July, 1993, (coauthor)
43. "A process for Industry Certification of Physical Simulation Codes" presented at the 25 the Fluid Dynamics Conference, Colorado Springs, Colorado, AIAA Paper No. 94-2235, July, 1994 (coauthor)
44. "An Overview of a Recent Industry Effort at CFD Code Certification" presented at the 26 the AIAA Fluid Dynamics Conference, San Diego, CA, AIAA Paper No. 95-2229, June, 1995 (coauthor)
45. The Stability of a Wing in a Flow" **Neural, Parallel & Scientific Computations Vol 14, No 1 March 2006** (coauthor)