



Professor Earl H. Dowell

See:

<http://mems.duke.edu/faculty/earl-h-dowell>

Silliam Holland Hall Professor of Mechanical Engineering
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Summary:

Professor Dowell's principal teaching interest and research activity is in the field of aeroelasticity - which is the study of the dynamic interaction between an aerodynamic flow and an elastic structure, such as aircraft wings in high speed flight, long span bridges and tall buildings responding to wind loadings, or airflow through the mouth and lungs. Dr. Dowell has also done research in acoustics, nonlinear dynamics, structural dynamics, and unsteady aerodynamics.

Professor Dowell's major research accomplishments include the first definitive research monograph on the aeroelasticity of plates and shells, the first derivation and solution of the nonlinear equations of motion for a helicopter rotor blade (the Hodges-Dowell equations), and work with Professor Kenneth Hall and several graduate students and post-doctoral fellows on reducing the dimensions of mathematical models for very complex high-dimensional fluid/structural systems. Professor Dowell teaches undergraduate and graduate courses on dynamics and aeroelasticity.

Education:

D.Sc. Massachusetts Institute of Technology, 1964
M.S. Massachusetts Institute of Technology, 1961
B.S. University of Illinois, 1959

Research Interests:

Broad field of aeroelasticity, acoustics, nonlinear dynamics, structural dynamics, and unsteady aerodynamics.

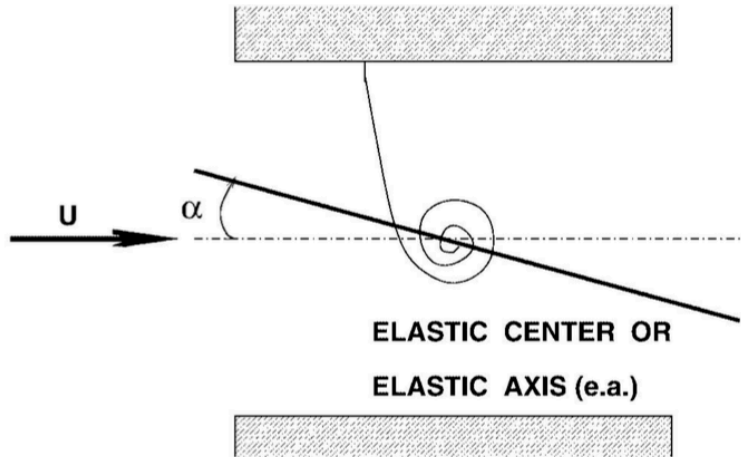


Figure 2.1. Geometry of typical section airfoil.

From: Earl H. Dowell, A Modern Course in Aeroelasticity: Revised and Enlarged Edition, Edition 5, Springer, 2014

Awards, Honors and Distinctions:

Daniel Guggenheim Medal. American Institute of Aeronautics and Astronautics. 2008
Spirit of St. Louis Medal. American Society of Mechanical Engineers. 2007
Walter J. and Angeline H. Crichlow Trust Prize. American Institute of Aeronautics and Astronautics. 2007
von Karman Lectureship Award. American Institute of Aeronautics and Astronautics. 2002
Membership. National Academy of Engineering. 1993

Selected Publications:

J. Dugundji, E.H. Dowell and B. Perkin, "Subsonic flutter of panels on continuous elastic foundations", AIAA Journal, Vol. 1, 1963, pp. 1146-1154

Dowell E (1966) Nonlinear oscillations of a fluttering plate. AIAA J 4(7):1267–1275

E. H. Dowell and S. E. Widnall, "Generalized aerodynamic forces on an oscillating cylindrical shell: Subsonic and supersonic flow", AIAA Journal, Vol. 4, No. 4, 1966, pp. 607-610

S.E. Widnall and E.H. Dowell, "Aerodynamic forces on an oscillating cylindrical duct with an internal flow", Journal of Sound and Vibration, Vol. 6, No. 1, 1967, pp. 71-85

E. H. Dowell 1967 AIAA Journal 5, 1508-1509. On the nonlinear flexural vibrations of rings.

E. H. Dowell 1967 AIAA Journal 5, 1856-1862. Nonlinear oscillations of a fluttering II.

E. H. Dowell and C. S. Ventres 1968 International Journal of Solids and Structures 4, 975-991. Modal equations for the nonlinear flexural vibrations of a cylindrical shell.

E. H. Dowell 1969 AIAA Journal 7, 424-431. Nonlinear flutter of curved plates.

E. H. Dowell 1970 AIAA Journal 8, 259-261. Nonlinear flutter of curved plates, II.

E. H. Dowell 1970 AIAA Journal 8, 385-399. Panel flutter: a review of the aeroelastic stability of plates and shells.

Dowell, E. H. (1971) AIAA J., 9(5), 834-841.

Dowell, E. H.: Aeroelasticity of Plates and Shells, 139pp., Noordhoff International Publ, Leyden, The Netherlands 1974

Dowell, E.H., Aeroelasticity of Plates and Shells, Noordhoff International Publishing, Leyden, The Netherlands, 1975.

Pierre, C. and Dowell, E. H., 'Localization of vibrations by structural irregularity', Journal of Sound and Vibration 114 (3), 1987, 549–564.

E. H. Dowell, C. S. Ventres and D. Tang 1998 Duke University Research Report, DT 98-1. Modal equations for the nonlinear flexural vibrations of a cylindrical shell.

E. H. Dowell 1998 *Journal of Fluids and Structures* 12, 1087-1089. Comments on the nonlinear vibrations of cylindrical shells.

E. H. Dowell and K. C. Hall, "Modeling of fluid structure interaction," *Ann. Rev. Fluid Mech.*, 33, 445–490 (2001).

Earl H. Dowell and Marat Ilgamov, *Studies in Nonlinear Aeroelasticity*, Springer, 2012

Earl H. Dowell, *A Modern Course in Aeroelasticity: Revised and Enlarged Edition, Edition 5*, Springer, 2014