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NASA Dryden History Office
NASA Dryden Flight Research Center

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Collection processed by:
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Descriptive Summary
Title: John W. Edwards Papers
Date (inclusive): 1965-2011
Collection Number: PP12.01
Creator: Edwards, J.W.
Edwards, John W., 1939-2011
Extent: Number of containers: 23
Volume: 27.35 cubic feet of physical records, and 16.6 gigabytes of digital records
Repository: NASA Dryden Flight Research Center, History Office
4800 Lilly Drive
Edwards, California 93523

Abstract: This collection consists of physical and digital records, which include research notes and data, project documentation, presentations, publications, administrative files, correspondence, educational materials, and visual media produced or collected by Dr. John W. Edwards, an aerospace engineer who worked for the National Air and Space Administration (NASA) from 1965 to 2010. The bulk of the collection documents Edwards' career at NASA as a research engineer, from his research in flight control systems at Dryden Flight Research Center from 1965 to 1980, to his work in computational aeroelasticity and unsteady aerodynamics at Langley Research Center from 1980 to 2010.

Language: English

Access
Access to portions of the collection is restricted.

Publication Rights
Copyright does not apply to United States government records. For non-government material, researcher must contact the original creator.

Preferred Citation

Abbreviated Citation
NASA DFRC. PP12.01. [Container number]: [Folder number]. [Identification of item]. [Date, if available].

Removed or Separated Material
Most published materials not authored by Edwards were separated from the collection. These include sets of publications that Edwards grouped by author or topic, as well as NASA Technical Memos and Technical Reports. Operational administrative documents, such as human resources and administrative forms, work orders, itemized travel budgets and bills, and receipts were separated. Personal medical documentation were also separated.
Biographical History

John William Edwards was born in Colfax, Iowa on July 8, 1939. In 1947, his father died of a heart attack and three years later, in 1950, his mother moved with Edwards and his older brother to Portland, Oregon where she had obtained a position teaching middle school. Edwards remained in Portland until he graduated from high school and was awarded a scholarship to attend Yale University. He received a B.A. in physics from Yale in 1961 and an M.S. in physics from the University of Washington, Seattle in 1963. He served in the U.S. Peace Corps from 1963 to 1965 teaching secondary school physics in Addis Ababa, Ethiopia at Haile Selassie I University (now Addis Ababa University). In 1967, Edwards married Adelaide Majerus. They had two daughters, Susan Elizabeth (b. 1967) and Mary Joanna (b. 1968). Edwards worked at NASA as an aerospace engineer from 1965 until he retired in 2007, and continued work for NASA as a contractor to 2010.

Edwards worked at NASA’s Dryden Flight Research Center (DFRC) between 1965 and 1980, where he helped pioneer digital flight control systems. At DFRC he worked on the Lifting Body flight test program, and in 1968 was assigned to the JetStar General Purpose Airborne Simulator project, where he developed computer programs for analysis of flight simulation experiments that were used at Dryden and by the Northrop Corporation for the next two decades. Edwards also developed computer algorithms that allowed DFRC to move flight simulation from analog methods to all-digital simulation in real time.

In 1970 Edwards wrote an internal memorandum advocating for a new concept: the use of digitally-controlled remotely-piloted vehicles for flight testing. This memorandum led to the development of DFRC’s Remotely Piloted Research Vehicles. Edwards was lead research engineer for the PA-30 Remotely Augmented Vehicle demonstration flight tests, and for the 3/8 scale F-15 Spin Research Vehicle flight tests. This technique of using remotely-piloted vehicles was used several projects at DFRC, including the Drones for Aerodynamic and Structural Testing (DAST), Highly Maneuverable Aircraft Technology (HiMAT), High Angle-of-Attack (Alpha) Research Vehicle, and F-8 Digital Fly-by-Wire flight programs. In recognition of his “ability to apply recently developed techniques to practical flight research programs” (NASA Langley, 2004), Edwards received the National Space Club’s Hugh L. Dryden Fellowship in 1974, which allowed him to pursue his Ph.D. in aeronautics and astronautics at Stanford University in Palo Alto, California from 1974 to 1976.

Edwards’ Ph.D. thesis, “Unsteady Aerodynamic Modeling and Active Aeroelastic Control,” was completed in 1977 and resolved a longstanding theoretical dispute in Theodore Theodorsen’s unsteady aerodynamic theory. With this research, Edwards helped establish the flutter analysis methods that have since become standard in the aerospace industry.

Edwards returned to DFRC in 1976 and was principal research engineer for the DAST program. In 1978, he developed an adaptive digital filter for the Space Shuttle in order to control pilot-induced oscillations caused by the vehicle’s poor handling. The Pilot-Induced Oscillation Suppression filter Edwards developed was added to the Shuttle’s flight control computer, and was used on all of the Shuttle’s orbital missions. Edwards received a patent for the filter algorithm, as well as several NASA awards.

In 1980, Edwards transferred to NASA’s Langley Research Center (LaRC), where he remained for the rest of his career. From 1981 to 1989 he was head of the Unsteady Aerodynamics Branch. He is credited with transitioning NASA from classical aeroelastic analysis methods to computational aeroelastics during this period. Under his management, the Unsteady Aerodynamics Branch developed the first code capable of transonic flutter analysis of complete vehicles. Called Computational Aeroelasticity Program-Transonic Small Disturbance (CAP-TSD), the code has been widely used throughout industry and academia.

From the 1980s through the rest of his career, Edwards organized symposia and gave lectures internationally about computational unsteady aerodynamics. He taught several graduate-level courses on aeronautics at George Washington University in affiliation with NASA’s Joint Institute for the Advancement of Flight Sciences, as well as at Old Dominion University and Christopher Newport College. He was a member of the North Atlantic Treaty Organization's (NATO's) Advisory Group for Aerospace Research and Development, and NATO’s Research and Technology Organization. He served on standing committees for the American Institute of Aeronautics and Astronautics (AIAA), and was associate editor of AIAA’s Journal of Guidance, Control and Dynamics from 1981 to 1983. He was also an active member of the Aerospace Flutter and Dynamics Council (known as the “Flutter Club”) from 1979 through 2010. In 2001 Edwards was elected as AIAA Fellow.

In 1989 Edwards returned to research as a senior research engineer in the Aeroelasticity Branch at LaRC. For the rest of his career, he concentrated on two areas of research: “shock-boundary layer interactions in transonic flutter and limit cycle oscillations, and wind tunnel model and structural vibrations” (NASA Langley, 2004). He developed a new interactive viscous boundary layer coupling method, which was incorporated into the CAP-TSD code. The resulting CAP-TSDV code enabled several first-time computations throughout the 1990s, which have been used to investigate various problems, including anomalous loads on the Space Shuttle vertical tail fin, residual pitch oscillations on the B-2 Northrop Grumman
B-2 Spirit (Stealth Bomber), and an unsteady hydroacoustics problems on a marine pump at Newport News Shipbuilding in Virginia.

In 1993, Edwards' calculations on Langley's National Transonic Facility (NTF) cryogenic wind tunnel led to new insights into wind tunnel resonance processes and research into the connections between acoustics and unsteady aerodynamics. In 1997 Edwards' measurements of model and tunnel vibrations in the NTF led to formation of the NTF Model Vibrations Project within the NTF Revitalization Project. In the early 2000s Edwards was also project leader for the Model for Aeroelastic Validation Research Involving Computation (MAVRIC) wind tunnel flutter model test.

From 2000 to his retirement in 2007, Edwards was involved in several accident investigations, including the Pegasus X-43 rocket mishap investigation, the American Airlines Flight 587 Airbus crash investigation, and the Space Shuttle Columbia Return to Flight effort. His computations on the aerodynamic stability of the Space Shuttle's External Tank Protuberance Aerodynamic Load (PAL) Ramps shielding the tank's cable trays, led to the removal of the foam ramps from the Shuttle's external tank for the return to flight.

After retiring in 2007, Edwards was appointed Distinguished Research Associate at NASA, and continued to work as a contract researcher on projects for NASA, including work for the NASA Engineering and Safety Center, and on the MAVRIC project. In addition to this work, he continued to teach, give lectures, and publish papers through 2010, and continued to correspond with his peers into 2011. Edwards died June 3, 2011 in Williamsburg, Virginia.

Sources Consulted:


Indexing Terms
The following terms may be used to index this collection.

Corporate Name
Ames Research Center
Langley Research Center
NASA Dryden Flight Research Center
National Transonic Facility (U.S.)
Langley Research Center. Unsteady Aerodynamics Branch

Personal Names
J.W. Edwards
John W. Edwards, 1939-2011
William P. Rodden

Subjects
Airfoils
American Airlines Flight 587 Crash, 2001
B-2 bomber
Computational Aeroelasticity Program - Transonic Small Disturbance (CAP-TSD)
Computational Aeroelasticity Program - Transonic Small Disturbance Viscous (CAP-TSDV)
Computational fluid dynamics
DAST program
F-15 strike eagle
Flutter (Aerodynamics)
Remotely piloted vehicles
Space Shuttles--Pilot-induced oscillations
Space Shuttles--Protuberance Air Load Ramps
Transonic Dynamics Tunnel (TDT)
Unsteady flow (Aerodynamics)

**Scope and Content**

This collection consists of research notes and data, project documentation, presentations, publications, administrative files, correspondence, educational materials, and visual media created or accumulated by Edwards between 1965 and 2011, thus documenting Edwards' entire career.

Series I contains the bulk of the physical papers. These documents are related closely to Edwards' research and professional life at NASA. These include scientific research projects (Subseries 1) his administrative documents (Subseries 2), and awards he received (Subseries 3). The files in Subseries 1 document NASA projects and research in which Edwards was involved. These include Edwards' handwritten project notes, raw data, personal correspondence, as well as formal documentation, NASA memos, and NASA technical reports. A significant portion of these documents concern the development and use of the Computational Aeroelasticity Program-Transonic Small Disturbance (CAP-TSD) and CAP-TSDV computer codes for modeling and analysis of unsteady aerodynamics and flutter.

Series II includes presentation documents, publications, and publication drafts authored by Edwards.

Series III contains correspondence between Edwards and his peers. A large body of correspondence between Edwards and William Rodden form a subseries, as do a set of correspondence concerning preparations for various professional conferences, and peer review of papers for the American Institute of Aeronautics and Astronautics' *Journal of Aircraft*.

Series IV includes documents from Edwards' Ph.D. coursework as well as documents compiled and authored by Edwards for various graduate-level courses on aerodynamics that he taught himself.

Series V is comprised of electronic records from 1995 to 2011. These include e-mail correspondence, born-digital files in multiple file formats, and optical media. Digital files include data as well as publications, reports, images, and videos.

Series VI includes visual media, primarily photographic materials and Video Home System (VHS) tapes, many of which document wind tunnel tests at NASA.

**Arrangement of the John W. Edwards Papers**

On the series-level, an arrangement was imposed by format to create six series, with physical papers in Series I-IV, digital media in Series V, and visual media in Series VI. Additionally, Series I-IV were arranged in topical groups based on function, which is the organization suggested in Edwards' original, incomplete organization.

Papers within each series are arranged by different methods:

- **Series I: NASA Papers, 1965-2010** is arranged primarily by project.
- **Series II: Works Authored by John W. Edwards** is arranged according to publication status.
- **Series III: Correspondence** is arranged by Edwards' original order.
- **Series IV: Education Papers** is arranged by Edwards' role as student and teacher.
- **Series V: Electronic Records, 1995-2011** is arranged by Edwards' original order.
- **Series VI: Visual Media** is arranged by format.

Materials within folders retain Edwards' original order where possible. A large portion of the collection was not arranged into folders by Edwards, but were ordered loosely by subject. New folders were created for these materials.

Arrangement is as follows:

I. NASA Papers, 1965-2010
   1. Project Documents
   2. Administrative Records
   3. Awards

II. Works Authored by John W. Edwards
   1. Presentations
   2. Publications and Drafts

III. Correspondence
   1. Bill Rodden
   2. Conference Planning
   3. Other

IV. Education Papers
   1. PhD Coursework
   2. Teaching
V. Electronic Records, 1995-2011
1. E-mail
2. Electronic Files
3. Optical Media

VI. Visual Media
1. Photographs, Negatives, and Film Strips
2. Two-inch Projection Slides
3. Video Home System (VHS) Tapes

Series | NASA Papers 1965-2010

Scope and Content Note
The bulk of the collection is located in this series, which is composed of papers related to Edwards' scientific research projects (Subseries 1) his administrative documents (Subseries 2), and awards he received (Subseries 3).

Most of the material is in Subseries 1, which is further organized into categories that represent significant groupings of documents by topic or project. These are: documents related to the Computational Aeroelasticity Program-Transonic Small Disturbance (CAP-TSD) and CAP-TSD viscous (CAP-TSDV) computer codes, raw data records, the Drones for Aerodynamic and Structural Testing (DAST) project, the National Transonic Facility (NTF), the National Full-scale Aerodynamics Complex Wind Tunnel Fan Blades project, notes and reference materials, the Space Shuttle Pilot Induced Oscillation Suppression Filter, and Space Shuttle Protuberance Air Load Ramps. Other files include research and data on various aircraft and wind tunnels over the course of Edwards' career. The CAP-TSD and CAP-TSDV documents include the complete files for a workshop taught by Edwards and his staff to instruct engineers at NASA and in the aerospace industry in using the code. These papers also document precursors of the code, such as LTRAN2, XTRAN2, XTRAN2L, and XTRAN3S, among others. Various computations, computer code, and memos are also included in the CAP-TSD and CAP-TSDV category. The DAST project is thoroughly documented in these papers. Edwards carefully arranged these project documents chronologically, and included notes, internal memos, and planning documents, such as diagrams of the control room setup and work orders for equipment needed for test flights.

The NTF category includes papers and data documenting wind tunnel testing, as well as records, correspondence, and memos that document a debate at NASA in 1998 about the future of the NTF program. This includes a handwritten draft of a letter by Edwards that argues "Wind tunnel technology and testing is/should be the 'life-blood' of Langley Research Center" (NASA Dryden History Office, 1998).

Subseries 2 includes administrative files from Edwards' career at Langley Research Center. A large portion of these records document Edwards' period as Head of the Unsteady Aerodynamics Branch at Langley, including documentation of a national peer review of the entire branch. Subseries 2 also includes meeting notes, travel narratives, management training documentation, calendars, resumes, evaluations, and performance reviews.

Subseries 3 includes various NASA and AIAA awards Edwards received, and photographs documenting the awards ceremonies.

Series II Works Authored by John W. Edwards  
Scope and Content Note  
This series is composed of presentation documents, publications, and publication drafts, all authored by Edwards. Presentations are printouts of documents (possibly printed from Microsoft PowerPoint presentations) that summarize projects and findings, and often include images and diagrams. These documents are from presentations and lectures given internally at NASA, to outside aerospace industry representatives, and at international conferences and meetings. Publications and publication drafts include NASA technical memoranda and reports, journal publications and drafts, and drafts of chapters from monographs—aerodynamics textbooks for which Edwards authored chapters on unsteady aerodynamics.

Series III Correspondence  
Scope and Content Note  
This series includes correspondence between Edwards and his peers in the aerospace industry and in academia throughout his career.  
Subseries 1 is comprised of correspondence with Bill Rodden, a friend and colleague with whom Edwards corresponded beginning in the 1970s and throughout his career. Rodden worked for several aerospace companies in Southern California in the 1960s and 1970s, including Douglas Aircraft, Northrop Corporation, and Aerospace Corporation. From the 1970s Rodden was an independent consulting engineer for the aerospace industry, and taught courses about aeroelasticity. Rodden and Edwards were both active members on the Aerospace Flutter and Dynamics Council, through which they corresponded regularly. In the 2000s, Rodden consulted Edwards frequently for input on Rodden's publications and presentations, including a monograph Rodden was working on that included a chapter on the General Aeroelastic Analysis Method, for which Edwards provided significant input and editing.  
Subseries 2 is comprised of correspondence with peers about organizing international symposia and conferences with the American Institute of Aeronautics and Astronautics, with NATO's Advisory Group for Aerospace Research and Development, and the Research and Technology Organization, and the International Forum on Aeroelasticity and Structural Dynamics.  
The bulk of material is in Subseries 3, Other Correspondence. Most of these documents are arranged by Edwards' original order at the folder level. These documents include correspondence with colleagues at national aeronautics agencies of other countries, such as the United Kingdom, Germany, the Netherlands, and Israel, discussing NATO-related topics, as well as sharing information about developments specific to Edwards' areas of research. Edwards also corresponded with his peers at NASA regarding projects they were collaborating on, including Peter Goorjian, Robert V. (Bob) Doggett Jr., and Robert M. (Bob) Bennett. He also had relationships with various private industry and academic engineers with whom he corresponded such as Danny Liu of Zona Technology, Inc., A.V. Balakrishnan of the University of California, Los Angeles, and Earl Dowell of Duke University.

Series IV Education Papers  
Scope and Content Note  
This series includes documents from Edwards' Ph.D. coursework (Subseries 1) and documents compiled and authored by Edwards for various graduate-level courses he taught himself (Subseries 2). Subseries 1 includes handwritten notes and calculations, course documents, assignments, and research papers from Edwards' Ph.D. courses at Stanford University between 1974 and 1977. Subseries 2 includes entire course plans for graduate-level courses on aerodynamics and aeroelasticity that Edwards taught primarily at Langley Research Center through George Washington University. These include drafts and final copies of lecture material, bibliographies, homework assignments, and examinations.
Series V Electronic Records 1995-2011

Scope and Content Note

This series is comprised of records created between 1995 and 2011. Subseries 1 includes e-mail correspondence authored between 2007 and 2011. These records include correspondence with international aeronautics organizations: NATO's Research Technology Organization Applied Vehicle Technology group, the American Institute of Aeronautics and Astronautics (AIAA), and International Forum on Aeroelasticity and Structural Dynamics (IFASD). E-mail related to NASA projects include NASA's Engineering and Safety Center Review Board, and the Models for Aeroelastic Validation Research Involving Computation, as well as a folder labeled 'accidents.' E-mail records also include documents related to graduate courses Edwards taught, and correspondence, including a folder of correspondence with Bill Rodden.

Subseries 2 includes electronic files dating from 2001 to 2011; most of these records date between 2003 and 2011. The bulk of these documents contain data, documentation, images, and videos related to Edwards' Space Shuttle External Tank Protuberance Air Load Ramp research. Documents regarding NASA Engineering and Safety Center are also a large portion of these files, which include meeting minutes, data, and reports. Subseries 2 also includes materials related to the Aerodynamics Flutter Dynamics Council, AIAA, IFASD, and NATO's Research and Technology Organization conferences and meetings, including page proofs of AIAA articles, and documents form the RTO Applied Vehicle Technology group. This subseries also contains correspondence, images, videos, and presentations about Professor Holt Ashley, Mach waves and acoustics research, and about the CAP-TSD code.

Subseries 3 includes optical media primarily created between 1995 and 2005. A large portion of these files include documentation of several workshops that Edwards taught to instruct industry engineers how to use the CAP-TSD computer code. One disk, “Fun with Aeroelasticity” is a collection of videos documenting visible flutter and aeroelastic phenomena in airplanes and other structures, and includes digitized NACA and NASA films from the 1960s-1980s.

Series VI Visual Media

Scope and Content Note

This series includes photographic materials and Video Home System (VHS) tapes covering the entire period of Edwards' career. Subseries 1 contains photographic prints, negatives and film strips. The bulk of the subseries is 8 x 10 photographic prints depicting airfoils, wind tunnels, airplanes, and NASA staff. Subseries 2 contains approximately 140 two-inch projection slides from the 1980s and 1990s. These seem to have been used for various presentations at conferences. Subseries 3 is comprised of 35 VHS tapes. Some of the VHS tapes were produced by NASA agencies, while others seem to have been created by Edwards. The labels on most of these tapes indicate that they may contain documentation of wind tunnel tests, experiments, and flight tests.