

References M

- ASTM (Amer. Soc. for Testing and Materials). (1967). Erosion by cavitation or impingement. *ASTM STP408*.
- Abramson, H.N. (1969). Hydroelasticity: a review of hydrofoil flutter. *Appl. Mech. Rev.*, **22**, No. 2, 115–121.
- Acosta, A.J. (1955). A note on partial cavitation of flat plate hydrofoils. *Calif. Inst. of Tech. Hydro. Lab. Rep. E-19.9*.
- Acosta, A.J. (1958). An experimental study of cavitating inducers. *Proc. Second ONR Symp. on Naval Hydrodynamics, ONR/ACR-38*, 533–557.
- Acosta, A.J. and Hollander, A. (1959). Remarks on cavitation in turbomachines. *Calif. Inst. of Tech. Rep. E-79.3*.
- Acosta, A.J. (1960). Cavitating flow past a cascade of circular arc hydrofoils. *Calif. Inst. of Tech. Hydro. Lab. Rep. E-79.2*.
- Acosta, A.J. and Bowerman, R.D. (1957). An experimental study of centrifugal pump impellers. *Trans. ASME*, **79**, 1821–1839.
- Acosta, A.J. (1955). A note on partial cavitation of flat plate hydrofoils. *Calif. Inst. of Tech. Hydro. Lab. Rep. E-19.9*.
- Acosta, A.J. and DeLong, R.K. (1971). Experimental investigation of non-steady forces on hydrofoils oscillating in heave. *Proc. IUTAM Symp. on non-steady flow of water at high speeds, Leningrad, USSR*, 95–104.
- Acosta, A.J. (1973). Hydrofoils and hydrofoil craft. *Ann. Rev. Fluid Mech.*, **5**, 161–184.
- Acosta, A.J. and Parkin, B.R. (1975). Cavitation inception—a selective review. *J. Ship Res.*, **19**, No. 4, 193–205.
- Adamczyk, J.J. (1975). The passage of a distorted velocity field through a cascade of airfoils. *Proc. Conf. on Unsteady Phenomena in Turbomachinery, AGARD Conf. Proc. No. 177*.
- Adkins, D.R. and Brennen, C.E. (1988). Analyses of hydrodynamic radial forces on centrifugal pump impellers. *ASME J. Fluids Eng.*, **110**, No. 1, 20–28.
- Agostinelli, A., Nobles, D. and Mockridge, C.R. (1960). An experimental investigation of radial thrust in centrifugal pumps. *ASME J. Eng. for Power*, **82**, 120–126.
- Alford, J.S. (1965). Protecting turbomachinery from self-excited rotor whirl. *ASME J. Eng. for Power*, **87**, 333–344.
- Anderson, H.H. (Undated). *Centrifugal pumps*. The Trade and Technical Press Ltd., Crown House, Morden, England.
- Anderson, H.H. (1955). Modern developments in the use of large single-entry centrifugal pumps. *Proc. Inst. Mech. Eng.*, **169**, 141–161.

- Arakeri, V.H. and Acosta, A.J. (1974). Viscous effects in the inception of cavitation on axisymmetric bodies. *ASME J. Fluids Eng.*, **95**, No. 4, 519–528.
- Arakeri, V.H. (1979). Cavitation inception. *Proc. Indian Acad. Sci., C2*, Part 2, 149–177.
- Arakeri, V.H. and Shangumanathan, V. (1985). On the evidence for the effect of bubble interference on cavitation noise. *J. Fluid Mech.*, **159**, 131–150.
- Arndt, N. and Franz, R. (1986). Observations of hydrodynamic forces on several inducers including the SSME LPOTP. *Calif. Inst. of Tech., Div. Eng. and Appl. Sci., Report No. E249.3*.
- Arndt, N., Acosta, A.J., Brennen, C.E., and Caughey, T.K. (1989). Rotor-stator interaction in a diffuser pump. *ASME J. of Turbomachinery*, **111**, 213–221.
- Arndt, N., Acosta, A.J., Brennen, C.E., and Caughey, T.K. (1990). Experimental investigation of rotor-stator interaction in a centrifugal pump with several vaned diffusers. *ASME J. of Turbomachinery*, **112**, 98–108.
- Arndt, R.E.A. and Ippen, A.T. (1968). Rough surface effects on cavitation inception. *ASME J. Basic Eng.*, **90**, 249–261.
- Arndt, R.E.A. and Keller, A.P. (1976). Free gas content effects on cavitation inception and noise in a free shear flow. *Proc. IAHR Symp. on two-phase flow and cavitation in power generation*, 3–16.
- Arndt, R.E.A. (1981). Cavitation in fluid machinery and hydraulic structures. *Ann. Rev. Fluid Mech.*, **13**, 273–328.
- ASTM (Amer. Soc. for Testing and Materials). (1967). Erosion by cavitation or impingement. *ASTM STP408*.
- Badowski, H.R. (1969). An explanation for instability in cavitating inducers. *Proc. 1969 ASME Cavitation Forum*, 38–40.
- Badowski, H.R. (1970). Inducers for centrifugal pumps. *Worthington Canada, Ltd., Internal Report*.
- Balje, O.E., 1981, “*Turbomachines. A guide to design, selection and theory*,” John Wiley and Sons, New York.
- Batchelor, G.K. (1967). An introduction to fluid dynamics. *Cambridge Univ. Press*.
- Benjamin, T.B. and Ellis, A.T. (1966). The collapse of cavitation bubbles and the pressures thereby produced against solid boundaries. *Phil. Trans. Roy. Soc., London, Ser. A*, **260**, 221–240.
- Betz, A. and Petersohn, E. (1931). Application of the theory of free jets. *NACA TM No. 667*.
- Bhattacharyya, A., Acosta, A.J., Brennen, C.E., and Caughey, T.K. (1993). Observations on off-design flows in non-cavitating inducers. *Proc. ASME Symp. on Pumping Machinery - 1993, FED-154*, 135–141.
- Biesheuvel, A. and van Wijngaarden, L. (1984). Two-phase flow equations for a dilute dispersion of gas bubbles in liquid. *J. Fluid Mech.*, **148**, 301–318.
- Biheller, H.J. (1965). Radial force on the impeller of centrifugal pumps with volute, semi-volute and fully concentric casings. *ASME J. Eng. for Power, July 1965*, 319–323.
- Billet, M.L. (1985). Cavitation nuclei measurements—a review. *Proc. 1985 Cavitation and Multiphase Flow Forum, FED 23*, 31–38.

- Binder, R.C. and Knapp, R.T. (1936). Experimental determinations of the flow characteristics in the volutes of centrifugal pumps. *Trans. ASME*, **58**, 649–661.
- Birkhoff, G. and Zarantonello, E.M. (1957). *Jets, wakes and cavities*. Academic Press, NY.
- Black, H.F. (1969). Effects of hydraulic forces in annular pressure seals on the vibrations of centrifugal pump rotors. *J. Mech. Eng. Sci.*, **11**, No. 2, 206–213.
- Black, H.F. and Jensen, D.N. (1970). Dynamic hybrid properties of annular pressure seals. *Proc. J. Mech. Eng.*, **184**, 92–100.
- Blake, F.G. (1949). The onset of cavitation in liquids: I. *Acoustics Res. Lab., Harvard Univ., Tech. Memo. No. 12*.
- Blake, W.K., Wolpert, M.J., and Geib, F.E. (1977). Cavitation noise and inception as influenced by boundary-layer development on a hydrofoil. *J. Fluid Mech.*, **80**, 617–640.
- Blake, J.R. and Gibson, D.C. (1987). Cavitation bubbles near boundaries. *Ann. Rev. Fluid Mech.*, **19**, 99–124.
- Bolleter, U., Wyss, A., Welte, I., and Sturchler, R. (1985). Measurements of hydrodynamic interaction matrices of boiler feed pump impellers. *ASME Paper No. 85-DET-148*.
- Bolleter, U., Wyss, A., Welte, I., and Sturchler, R. (1987). Measurement of hydrodynamic matrices of boiler feed pump impellers. *ASME J. Vibrations, Stress and Reliability in Design*, **109**, 144–151.
- Braisted, D.M. (1979). Cavitation induced instabilities associated with turbomachines. *Ph.D. Thesis, California Institute of Technology, Pasadena, Ca.*
- Braisted, D.M. and Brennen, C.E. (1980). Auto-oscillation of cavitating inducers. In *Polyphase Flow and Transport Technology*, (ed: R.A. Bajura), ASME Publ., New York, 157–166.
- Brennen, C.E. (1973). The dynamic behavior and compliance of a stream of cavitating bubbles. *ASME J. Fluids Eng.*, **95**, 533–542.
- Brennen, C.E. and Acosta, A.J. (1973). Theoretical, quasi-static analyses of cavitation compliance in turbopumps. *J. Spacecraft and Rockets*, **10**, No.3, 175–180.
- Brennen, C. (1976). On the flow in an annulus surrounding a whirling cylinder. *J. Fluid Mech.*, **75**, 173–191.
- Brennen, C.E. (1978). Bubbly flow model for the dynamic characteristics of cavitating pumps. *J. Fluid Mech.*, **89**, 223–240.
- Brennen, C.E., Oey, K., and Babcock, C.D. (1980). On the leading edge flutter of cavitating hydrofoils. *J. Ship Res.*, **24**, No. 3, 135–146.
- Brennen, C.E., Acosta, A.J., and Caughey, T.K. (1986). Impeller fluid forces. *Proc. NASA Advanced Earth-to-Orbit Propulsion Technology Conference, Huntsville, AL, NASA Conf. Publ. 2436*, 270–295.
- Brennen, C.E., Franz, R., and Arndt, N. (1988). Effects of cavitation on rotordynamic force matrices. *Proc. Third Earth to Orbit Propulsion Conference, NASA Conf. Publ. 3012*, 227–239.
- Brennen, C.E. (1994). *Hydrodynamics of pumps*. Oxford University Press and Concepts ETI.
- Brennen, C.E. (1995). *Cavitation and bubble dynamics*. Oxford University Press.

- Breugelmans, F.A.E. and Sen, M. (1982). Prerotation and fluid recirculation in the suction pipe of centrifugal pumps. *Proc. 11th Int. Pump Symp., Texas A&M Univ.*, 165–180.
- Brun, K., Flack, R.D. and Gruver, J.K., 1996, “Laser velocimeter measurements in the pump of an automotive torque converter. Part II - Unsteady measurements,” *ASME J. Fluids Eng.*, **118**, pp. 570–577.
- Busemann, A. (1928). Das Förderhöhenverhältnis radialer Kreiselpumpen mit logarithmisch-spiraligen Schaufeln. *Z. angew. Math. u. Mech.*, **8**, 372.
- By, R.R., Kunz, R. and Lakshminarayana, B., 1995, “Navier-Stokes analysis of the pump flow field of an automotive torque converter,” *ASME J. Fluids Eng.*, **117**, pp. 116–122.
- By, R.R. and Lakshminarayana, B., 1995, “Measurement and analysis of static pressure field in a torque converter pump,” *ASME J. Fluids Eng.*, **117**, pp. 109–115.
- Ceccio, S.L. and Brennen, C.E. (1991). Observations of the dynamics and acoustics of travelling bubble cavitation. *J. Fluid Mech.*, **233**, 633–660. Corrigenda, **240**, 686.
- Chahine, G.L. (1982). Cloud cavitation theory. *Proc. 14th ONR Symp. on Naval Hydrodynamics*, 165–194.
- Chamieh, D.S. and Acosta, A.J. (1981). Calculation of the stiffness matrix of an impeller eccentrically located within a volute. *Proc. ASME Cavitation and Polyphase Flow Forum*, 51–53.
- Chamieh, D. (1983). Forces on a whirling centrifugal pump-impeller. *Ph.D. Thesis, Calif. Inst. of Tech., and Div. of Eng. and App. Sci. Report No. E249.2*.
- Chamieh, D.S., Acosta, A.J., Brennen, C.E., and Caughey, T.K. (1985). Experimental measurements of hydrodynamic radial forces and stiffness matrices for a centrifugal pump-impeller. *ASME J. Fluids Eng.*, **107**, No. 3, 307–315.
- Childs, D.W. (1983a). Dynamic analysis of turbulent annular seals based on Hirs' lubrication equation. *ASME J. Lubr. Tech.*, **105**, 429–436.
- Childs, D.W. (1983b). Finite length solutions for rotordynamic coefficients of turbulent annular seals. *ASME J. Lubr. Tech.*, **105**, 437–445.
- Childs, D.W. (1987). Fluid structure interaction forces at pump-impeller-shroud surfaces for rotordynamic calculations. *ASME Symp. on Rotating Machinery Dynamics*, **2**, 581–593.
- Childs, D.W. (1989). Fluid structure interaction forces at pump-impeller-shroud surfaces for rotordynamic calculations. *ASME J. Vibration, Acoustics, Stress and Reliability in Design*, **111**, 216–225.
- Childs, D.W. and Dressman, J.B. (1982). Testing of turbulent seals for rotordynamic coefficients. *Proc. Workshop on Rotordynamic Instability Problems in High-Performance Turbomachinery, NASA Conf. Publ. 2250*, 157–171.
- Childs, D.W. and Dressman, J.B. (1985). Convergent-tapered annular seals: analysis and testing for rotordynamic coefficients. *ASME J. Tribology*, **107**, 307–317.
- Childs, D.W. and Kim, C.-H. (1985). Analysis and testing for rotordynamic coefficients of turbulent annular seals with different directionally homogeneous surface roughness treatment for rotor and stator elements. *ASME J. Tribology*, **107**, 296–306.

- Childs, D.W. and Scharrer, J.K. (1986). Experimental rotordynamic coefficient results for teeth-on-rotor and teeth-on-stator labyrinth gas seals. *Proc. Adv. Earth-to-Orbit Propulsion Tech. Conf., NASA Conf. Publ. 2436*, 327–345.
- Chivers, T.C. (1969). Cavitation in centrifugal pumps. *Proc. Inst. Mech. Eng.*, **184**, Part I, No. 2, 37–68.
- Chu, S., Dong, R., and Katz, J. (1993). The noise characteristics within the volute of a centrifugal pump for different tongue geometries. *Proc. ASME Symp. on Flow Noise, Modelling, Measurement and Control*.
- Clements, H.A. and Fortunato, E., 1982, “An advance in reversing transmissions for ship propulsion,” *ASME Paper No. 82-GT-313*.
- Clements, H.A., 1989, “Stopping and reversing high power ships,” *ASME Paper No. 89-GT-231*.
- Colding-Jorgensen, J. (1979). The effect of fluid forces on rotor stability of centrifugal compressors and pumps. *Ph.D. Thesis, Tech. Univ. of Denmark*.
- Constant, H. (1939). Performance of cascades of aerofoils. *Royal Aircraft Est. Note No. E3696 and ARC Rep. No. 4155*.
- Cooper, P. (1967). Analysis of single- and two-phase flows in turbo-pump inducers. *ASME J. Eng. Power*, **89**, 577–588.
- Csanady, G.T. (1964). *Theory of turbomachines*. McGraw-Hill, New York.
- Cumpsty, N. A. (1977). Review—a critical review of turbomachinery noise. *ASME J. Fluids Eng.*, **99**, 278–293.
- Cunningham, R.G., Hansen, A.G. and Na, T.Y. (1970). Jet pump cavitation. *ASME J. Basic Eng.*, **92**, 483–492.
- Cunningham, R.G. (1995). Liquid jet pumps for two-phase flows. *ASME J. Fluids Eng.*, **177**, 309–316.
- d'Agostino, L. and Brennen, C.E. (1983). On the acoustical dynamics of bubble clouds. *ASME Cavitation and Multiphase Flow Forum*, 72–75.
- d'Agostino, L., Brennen, C.E., Acosta, A.J. (1988). Linearized dynamics of two-dimensional bubbly and cavitating flows over slender surfaces. *J. Fluid Mech.*, **192**, 485–509.
- d'Agostino, L. and Brennen, C.E. (1989). Linearized dynamics of spherical bubble clouds. *J. Fluid Mech.*, **199**, 155–176.
- Daugherty, R.L. (1920). *Hydraulic turbines*. McGraw-Hill Book Co.
- Dean, R. C. (1959). On the necessity of unsteady flow in fluid machines. *ASME J. Basic Eng.*, **81**, 24–28.
- del Valle, J., Braisted, D.M., and Brennen, C.E. (1992). The effects of inlet flow modification on cavitating inducer performance. *ASME J. Turbomachinery*, **114**, 360–365.
- De Siervi, F., Viguier, H.C., Greitzer, E.M., and Tan, C.S. (1982). Mechanisms of inlet-vortex formation. *J. Fluid Mech.*, **124**, 173–207.
- Dicmas, J.L. (1987). *Vertical turbine, mixed flow, and propeller pumps*. McGraw-Hill Book Co.
- Dixon, S.L. (1978). *Fluid mechanics, thermodynamics of turbomachinery*. Pergamon Press.

- Domm, H. and Hergt, P. (1970). Radial forces on impeller of volute casing pumps. In *Flow Research on Blading* (ed: L.S. Dzung), Elsevier Publ. Co., 305–321.
- Dowson, D. and Taylor, C.M. (1979). Cavitation in bearings. *Ann. Rev. Fluid Mech.*, **11**, 35–66.
- Doyle, H.E. (1980). Field experiences with rotordynamic instability in high-performance turbomachinery. *Proc. First Workshop on Rotordynamic Instability Problems in High-Performance Turbomachinery, NASA Conf. Pub. 2133*, 3–13.
- Dring, R.P., Joslyn, H.D., Hardin, L.W., and Wagner, J.H. (1982). Turbine rotor-stator interaction. *ASME J. Eng. for Power*, **104**, 729–742.
- Duller, G.A. (1966). On the linear theory of cascades of supercavitating hydrofoils. *U.K. Nat. Eng. Lab. Rep. No. 218*.
- Duncan, A.B. (1966). Vibrations in boiler feed pumps: a critical review of experimental and service experience. *Proc. Inst. Mech. Eng.*, **181**, 55–64.
- Dussourd, J. L. (1968). An investigation of pulsations in the boiler feed system of a central power station. *ASME J. Basic Eng.*, **90**, 607–619.
- Duttweiler, M.E. and Brennen, C.E. (2002). Surge instability on a cavitating propeller. *J. Fluid Mech.*, **458**, 133–152.
- Eck, B. (1973). *Fans*. Pergamon Press, London.
- Eckardt, D. (1976). Detailed flow investigations with a high-speed centrifugal compressor impeller. *ASME J. Fluids Eng.*, **98**, 390–420.
- Ehrich, F. and Childs, D. (1984). Self-excited vibration in high-performance turbomachinery. *Mech. Eng.*, May 1984, 66–79.
- Ek, B. (1957). *Technische Strömungslehre*. Springer-Verlag.
- Ek, M.C. (1978). Solution of the subsynchronous whirl problem in the high pressure hydrogen turbomachinery of the Space Shuttle Main Engine. *Proc. AIAA/SAE 14th Joint Propulsion Conf., Las Vegas, Nevada, Paper No. 78-1002*.
- Emmons, H.W., Pearson, C.E., and Grant, H.P. (1955). Compressor surge and stall propagation. *Trans. ASME*, **79**, 455–469.
- Emmons, H.W., Kronauer, R.E., and Rockett, J.A. (1959). A survey of stall propagation—experiment and theory. *ASME J. Basic Eng.*, **81**, 409–416.
- Falvey, H.T. (1990). Cavitation in chutes and spillways. *US Bur. of Reclamation, Eng. Monograph No. 42*.
- Ferguson, T.B. (1963). *The centrifugal compressor stage*. Butterworth, London.
- Fischer, K. and Thoma, D. (1932). Investigation of the flow conditions in a centrifugal pump. *Trans. ASME, Hydraulics*, **54**, 141–155.
- Fitzpatrick, H.M. and Strasberg, M. (1956). Hydrodynamic sources of sound. *Proc. First ONR Symp. on Naval Hydrodynamics*, 241–280.
- Fortunato, E. and Clements, H.A., 1979, “Marine reversing gear incorporating single reversing hydraulic coupling and direct-drive clutch for each turbine,” *ASME Paper No. 79-GT-61*.

- France, D. (1986). Rotor instability in centrifugal pumps. *Shock and Vibr. Digest of Vibr. Inst.*, Jan. 1986, 9–13.
- Franklin, R.E. and McMillan, J. (1984). Noise generation in cavitating flows, the submerged jet. *ASME J. Fluids Eng.*, **106**, 336–341.
- Franz, R. and Arndt, N. (1986). Measurements of hydrodynamic forces on the impeller of the HPOTP of the SSME. *Calif. Inst. of Tech., Div. Eng. and Appl. Sci., Report No. E249*.
- Franz, R., Acosta, A.J., Brennen, C.E. and Caughey, T.K. (1989). The rotordynamic forces on a centrifugal pump impeller in the presence of cavitation. *Proc. ASME Symp. Pumping Machinery*, **FED-81**, 205–212.
- Franz, R., Acosta, A.J., Brennen, C.E. and Caughey, T.K. (1990). The rotordynamic forces on a centrifugal pump impeller in the presence of cavitation. *ASME J. Fluids Eng.*, **112**, 264–271.
- Fritz, R.J. (1970). The effects of an annular fluid on the vibrations of a long rotor. Part I—Theory and Part II—Test. *ASME J. Basic Eng.*, **92**, 923–937.
- Fujikawa, S. and Akamatsu, T. (1980). Effects of the non-equilibrium condensation of vapour on the pressure wave produced by the collapse of a bubble in a liquid. *J. Fluid Mech.*, **97**, 481–512.
- Fung, Y.C. (1955). *An introduction to the theory of aeroelasticity*. John Wiley and Sons.
- Furuya, O. and Acosta, A.J. (1973). A note on the calculation of supercavitating hydrofoils with rounded noses. *ASME J. Fluids Eng.*, **95**, 222–228.
- Furuya, O. (1974). Supercavitating linear cascades with rounded noses. *ASME J. Basic Eng., Series D*, **96**, 35–42.
- Furuya, O. (1975). Exact supercavitating cascade theory. *ASME J. Fluids Eng.*, **97**, 419–429.
- Furuya, O. (1985). An analytical model for prediction of two-phase (non-condensable) flow pump performance. *ASME J. Fluids Eng.*, **107**, 139–147.
- Furuya, O. and Maekawa, S. (1985). An analytical model for prediction of two-phase flow pump performance – condensable flow case. *ASME Cavitation and Multiphase Flow Forum*, **FED-23**, 74–77.
- Gallus, H.E. (1979). High speed blade-wake interactions. *von Karman Inst. for Fluid Mech. Lecture Series 1979-3*, **2**.
- Gallus, H.E., Lambertz, J., and Wallmann, T. (1980). Blade-row interaction in an axial flow subsonic compressor stage. *ASME J. Eng. for Power*, **102**, 169–177.
- Gates, E.M. and Acosta, A.J. (1978). Some effects of several free stream factors on cavitation inception on axisymmetric bodies. *Proc. 12th ONR Symp. on Naval Hydrodynamics*, 86–108.
- Gavrilov, L.R. (1970). Free gas content of a liquid and acoustical techniques for its measurement. *Sov. Phys.—Acoustics*, **15**, No. 3, 285–295.
- Gongwer, C. (1941). A theory of cavitation flow in centrifugal-pump impellers. *Trans. ASME*, **63**, 29–40.
- Gosline, J.E. and O'Brien, M.P. (1934). The water jet pump. *Univ. California Publ. in Eng.*, **3**, No. 3, 167–190.
- Grabow, G. (1964). Radialdruck bei Kreiselpumpen. *Pumpen und Verdichter*, No. 2, 11–19.

- Greitzer, E.M. (1976). Surge and rotating stall in axial flow compressors. Part I: Theoretical compression system model. Part II: Experimental results and comparison with theory. *ASME J. Eng. for Power*, **98**, 190–211.
- Greitzer, E.M. (1981). The stability of pumping systems—the 1980 Freeman Scholar Lecture. *ASME J. Fluids Eng.*, **103**, 193–242.
- Grist, E. (1974). NPSH requirements for avoidance of unacceptable cavitation erosion in centrifugal pumps. *Proc. I.Mech.E. Conf. on Cavitation*, 153–163.
- Gross, L.A. (1973). An experimental investigation of two-phase liquid oxygen pumping. *NASA TN D-7451*.
- Gruver, J.K., Flack, R.D. and Brun, K., 1996, “Laser velocimeter measurements in the pump of an automotive torque converter. Part I - Average measurements,” *ASME J. Fluids Eng.*, **118**, pp. 562–569.
- Guinard, P., Fuller, T. and Acosta, A.J. (1953). Experimental study of axial flow pump cavitation. *Calif. Inst. of Tech. Hydro. Lab. Report, E-19.3*.
- Guinzburg, A., Brennen, C.E., Acosta, A.J., and Caughey, T.K. (1990). Measurements of the rotordynamic shroud forces for centrifugal pumps. *Proc. ASME Turbomachinery Forum, FED-96*, 23–26.
- Ham, N.D. (1968). Aerodynamic loading on a two-dimensional airfoil during dynamic stall. *AIAA J.*, **6**, 1927–1934.
- Hansen, A.G. and Na, T.Y. (1968). A jet pump cavitation parameter based on NPSH. *ASME Paper*, 68-WA/FE-42.
- Hartmann, M.J. and Soltis, R.F. (1960). Observation of cavitation in a low hub-tip ratio axial flow pump. *Proc. Gas Turbine Power and Hydraulic Conf., ASME Paper No. 60-HYD-14*.
- Henderson and Tucker (1962). Performance investigation of some high speed pump inducers. *R.P.E. Tech. Note 214*. Referred to by Janigro and Ferrini (1973) but not located by the author.
- Herdt, P. and Benner, R. (1968). Visuelle Untersuchung der Strömung in Leitrad einer Radialpumpe. *Schweiz. Banztg.*, **86**, 716–720.
- Herdt, P. and Krieger, P. (1969-70). Radial forces in centrifugal pumps with guide vanes. *Proc. Inst. Mech. Eng.*, **184**, Part 3N, 101–107.
- Herrig, L.J., Emery, J.C., and Erwin, J.R. (1957). Systematic two-dimensional cascade tests of NACA 65-series compressor blades at low speeds. *NACA TN 3916*.
- Hickling, R. and Plesset, M.S. (1964). Collapse and rebound of a spherical bubble in water. *Phys. Fluids*, **7**, 7–14.
- Hirs, G.G. (1973). A bulk-flow theory for turbulence in lubricant films. *ASME J. of Lubr. Tech.*, April 1973, 137–146.
- Hobbs, J.M., Laird, A., and Brunton, W.C. (1967). Laboratory evaluation of the vibratory cavitation erosion test. *Nat. Eng. Lab. (U.K.), Report No. 271*.
- Hobson, D. E. and Marshall, A. (1979). Surge in centrifugal pumps. *Proc. 6th Conf. on Fluid Machinery, Budapest*, 475–483.
- Holl, J.W. and Wislicenus, G.F. (1961). Scale effects on cavitation. *ASME J. Basic Eng.*, **83**, 385–398.

- Holl, J.W. and Treaster, A.L. (1966). Cavitation hysteresis. *ASME J. Basic Eng.*, **88**, 199–212.
- Holl, J.W. (1969). Limited cavitation. *Cavitation State of Knowledge*, ASME, 26–63.
- Hori, Y. (1959). A theory of oil whip. *ASME J. Appl. Mech.*, June 1959, 189–198.
- Horlock, J. M. (1968). Fluctuating lift forces on airfoils moving through transverse and chordwise gusts. *ASME J. Basic Eng.*, 494–500.
- Horlock, J.H. (1973). *Axial flow compressors*. Robert E. Krieger Publ. Co., New York.
- Horlock, J.H. and Lakshminarayana, B. (1973). Secondary flows: theory, experiment and application in turbomachinery aerodynamics. *Ann. Rev. Fluid Mech.*, **5**, 247–279.
- Howard, J.H.G. and Osborne, C. (1977). A centrifugal compressor flow analysis employing a jet-wake passage model. *ASME J. Fluids Eng.*, **99**, 141–147.
- Howell, A.R. (1942). The present basis of axial flow compressor design: Part I—Cascade theory and performance. *ARC R and M No. 2095*.
- Hsu, C.C. (1972). On flow past a supercavitating cascade of cambered blades. *ASME J. Basic Eng., Series D*, **94**, 163–168.
- Hydraulic Institute, New York. (1965). *Standards of the Hydraulic Institute* (11th edition).
- Iino, T. and Kasai, K. (1985). An analysis of unsteady flow induced by interaction between a centrifugal impeller and a vaned diffuser (in Japanese). *Trans. Japan Soc. of Mech. Eng.*, **51**, No.471, 154–159.
- Iversen, H.W., Rolling, R.E., and Carlson, J.J. (1960). Volute pressure distribution, radial force on the impeller and volute mixing losses of a radial flow centrifugal pump. *ASME J. Eng. for Power*, **82**, 136–144.
- Jaeger, C. (1963). The theory of resonance in hydro-power systems, discussion of incidents and accidents occurring in pressure systems. *ASME J. Basic Eng.*, **85**, 631–640.
- Jakobsen, J.K. (1964). On the mechanism of head breakdown in cavitating inducers. *ASME J. Basic Eng.*, **86**, 291–304.
- Jakobsen, J.K. (1971). *Liquid rocket engine turbopumps*. NASA SP 8052.
- Janigro, A. and Ferrini, F. (1973). Inducer pumps. In *Recent progress in pump research, von Karman Inst. for Fluid Dynamics, Lecture Series 61*.
- Jansen, W. 1964. Rotating stall in a radial vaneless diffuser. *ASME J. Basic Eng.*, **86**, 750–758.
- Japikse, D. (1984). *Turbomachinery diffuser design technology*. Concepts ETI, Inc., Norwich, VT.
- Jery, B. and Franz, R. (1982). Stiffness matrices for the Rocketdyne diffuser volute. *Calif. Inst. of Tech., Div. Eng. and Appl. Sci., Report No. E249.1*.
- Jery, B., Acosta, A.J., Brennen, C.E., and Caughey, T.K. (1985). Forces on centrifugal pump impellers. *Proc. Second Int. Pump Symp., Houston, Texas*, 21–32.
- Johnson, V.E. and Hsieh, T. (1966). The influence of the trajectories of gas nuclei on cavitation inception. *Proc. 6th ONR Symp. on Naval Hydrodynamics*, 7-1.
- Johnsson, C.A. (1969). Cavitation inception on headforms, further tests. *Proc. 12th Int. Towing Tank Conf., Rome*, 381–392.

- Johnston, J.P. and Dean, R.C. (1966). Losses in vaneless diffusers of centrifugal compressors and pumps. *ASME J. Eng. for Power*, **88**, 49–62.
- Kamijo, K., Shimura, T., and Watanabe, M. (1977). An experimental investigation of cavitating inducer instability. *ASME Paper 77-WA/FW-14*.
- Kamijo, K., Shimura, T., and Watanabe, M. (1980). A visual observation cavitating inducer instability. *Nat. Aero. Lab. (Japan), Rept. NAL TR-598T*.
- Kamijo, K., Yoshida, M., and Tsujimoto, Y. (1992). Hydraulic and mechanical performance of LE-7 LOX pump inducer. *Proc. 28th Joint Propulsion Conf., Paper AIAA-92-3133*.
- Karyeacis, M.P., Miskovich, R.S., and Brennen, C.E. (1989). Rotordynamic tests in cavitation of the SEP inducer. *Calif. Inst. of Tech., Div. of Eng. and Appl. Sci., Report E200.27*.
- Karassik, I.J., Krutzsch, W.C., Fraser, W.H. and Messina, J.P. (1986). *Pump handbook*. McGraw-Hill Book Co.
- Katsanis, T. (1964). Use of arbitrary quasi-orthogonals for calculating flow distribution in the meridional plane of a turbomachine. *NASA TN D-2546*.
- Katsanis, T. and McNally, W.D. (1977). Revised Fortran program for calculating velocities and streamlines on the hub-shroud midchannel stream surface of an axial-, radial-, or mixed-flow turbomachine or annular duct. *NASA TN D-8430 and D-8431*.
- Katz, J., Gowing, S., O'Hern, T., and Acosta, A.J. (1984). A comparative study between holographic and light-scattering techniques of microbubble detection. *Proc. IUTAM Symp. on Measuring Techniques in Gas-Liquid Two-Phase Flows*, Springer-Verlag, 41–66.
- Keller, A.P. (1974). Investigations concerning scale effects of the inception of cavitation. *Proc. I.Mech.E. Conf. on Cavitation*, 109–117.
- Keller, A.P. and Weitendorf, E.A. (1976). Influence of undissolved air content on cavitation phenomena at the propeller blades and on induced hull pressure amplitudes. *Proc. IAHR Symp. on two-phase flow and cavitation in power generation*, 65–76.
- Kemp, N. H. and Ohashi, H. (1975). Forces on unstaggered airfoil cascades in unsteady in-phase motion with applications to harmonic oscillation. *Proc. Symp. on Unsteady Aerodynamics, Tuscon, Ariz.*, 793–826.
- Kemp, N. H. and Sears, W. R. (1955). The unsteady forces due to viscous wakes in turbomachines. *J. Aero Sci.*, **22**, No.7, 478–483.
- Kermene, R.W. (1956). Water tunnel tests of NACA 4412 and Walchner Profile 7 hydrofoils in noncavitating and cavitating flows. *Calif. Inst. of Tech., Hydrodynamics Lab. Rep. 47-5*.
- Kerrebrock, J.L. (1977). *Aircraft engines and gas turbines*. MIT Press.
- Kimoto, H. (1987). An experimental evaluation of the effects of a water microjet and a shock wave by a local pressure sensor. *ASME Int. Symp. on Cavitation Res. Fac. and Techniques, FED* **57**, 217–224.
- Knapp, R.T., Daily, J.W., and Hammitt, F.G. (1970). *Cavitation*. McGraw-Hill, New York.
- König, E. (1922). Potentialströmung durch Gitter. *Z. angew. Math. u. Mech.*, **2**, 422.
- KSB. (1975). *KSB Centrifugal pump lexicon*. Klein, Schanzlin and Becker, Germany.

- Lakshminarayana, B. (1972). Visualization study of flow in axial flow inducer. *ASME J. Basic Eng.*, **94**, 777–787.
- Lakshminarayana, B. (1981). Analytical and experimental study of flow phenomena in noncavitating rocket pump inducers. *NASA Contractor Rep. 3471*.
- Lauterborn, W. and Bolle, H. (1975). Experimental investigations of cavitation bubble collapse in the neighborhood of a solid boundary. *J. Fluid Mech.*, **72**, 391–399.
- Lazarkiewicz, S. and Troskolanski, A.T. (1965). *Pompy wirowe. (Impeller pumps.)* Translated from Polish by D.K.Rutter. Publ. by Pergamon Press.
- Lea, J.F., Nickens, H.V. and Wells, M.R. (2008). *Gas well deliquification*. Elsevier Inc.
- Lee, C.J.M. (1966). Written discussion in *Proc. Symp. on Pump Design, Testing and Operation, Natl. Eng. Lab., Scotland*, 114-115.
- Lefcort, M.D. (1965). An investigation into unsteady blade forces in turbomachines. *ASME J. Eng. for Power*, **87**, 345–354.
- Lenneman, E. and Howard, J. H. G. (1970). Unsteady flow phenomena in centrifugal impeller passages. *ASME J. Eng. for Power*, **92-1**, 65–72.
- Lieblein, S., Schwenk, F.C., and Broderick, R.L. (1953). Diffusion factor for estimating losses and limiting blade loadings in axial-flow-compressor blade elements. *NACA RM E53D01*.
- Lieblein, S. (1965). Experimental flow in two-dimensional cascades. *Aerodynamic design of axial flow compressors, NASA SP-36*, 183–226.
- Lindgren, H. and Johnsson, C.A. (1966). Cavitation inception on headforms, ITTC comparative experiments. *Proc. 11th Int. Towing Tank Conf., Tokyo*, 219–232.
- Lomakin, A.A. (1958). Calculation of the critical speed and the conditions to ensure dynamic stability of the rotors in high pressure hydraulic machines, taking account of the forces in the seals (in Russian). *Energomashinostroenie*, **14**, No.4, 1–5.
- Lorett, J.A. and Gopalakrishnan, S. (1983). Interaction between impeller and volute of pumps at off-design conditions. *Proc. ASME Symp. on Performance Characteristics of Hydraulic Turbines and Pumps, FED-6*, 135–140.
- Lush, P.A. and Angell, B. (1984). Correlation of cavitation erosion and sound pressure level. *ASME J. Fluids Eng.*, **106**, 347–351.
- Makay, E. and Szamody, O. (1978). Survey of feed pump outages. *Electric Power Res. Inst. Rep. FP-754*.
- Makay, E. (1980). Centrifugal pump hydraulic instability. *Electric Power Res. Inst. Rep. EPRI CS-1445*.
- Mansell, C.J. (1974). Impeller cavitation damage on a pump operating below its rated discharge. *Proc. of Conf. on Cavitation, Inst. of Mech. Eng.*, 185–191.
- Marscher, W.D. (1988). Subsynchronous vibration in boiler feed pumps due to stable response to hydraulic forces on at part-load. *Proc. I.Mech.E. Conf. on Part Load Pumping, London*, 167–175.
- Martin, M. (1962). Unsteady lift and moment on fully cavitating hydrofoils at zero cavitation number. *J. Ship Res.*, **6**, No.1, 15–25.

- McCroskey, W. J. (1977). Some current research in unsteady fluid dynamics—the 1976 Freeman Scholar Lecture. *ASME J. Fluids Eng.*, **99**, 8–38.
- McNulty, P.J. and Pearsall, I.S. (1979). Cavitation inception in pumps. *ASME Int. Symp. on Cavitation Inception*, 163–170.
- Medwin, H. (1977). In situ acoustic measurements of microbubbles at sea. *J. Geophys. Res.*, **82**, No.6, 921–976.
- Meyer, R.X. (1958). The effect of wakes on the transient pressure and velocity distributions in turbomachines. *Trans. ASME*, **80**, 1544.
- Mikolajczak, A. A., Arnoldi, R. A., Snyder, L. E., and Stargardter, H. (1975). Advances in fan and compressor blade flutter analysis and predictions. *J. Aircraft*, **12**, No.4, 325–332.
- Miller, C.D. and Gross, L.A. (1967). A performance investigation of an eight-inch hubless pump inducer in water and liquid nitrogen. *NASA TN D-3807*.
- Mimura, Y. (1958). The flow with wake past an oblique plate. *J. Phys. Soc. Japan*, **13**, 1048–1055.
- Miskovich, R.S. and Brennen, C.E. (1992). Some unsteady fluid forces measured on pump impellers. *ASME J. Fluids Eng.*, **114**, 632–637.
- Miyagawa, K., Mutaguchi, K., Kanki, H., Iwasaki, Y., Sakamoto, A., Fujiki, S., Terasaki, A., and Furuya, S. (1992). An experimental investigation of fluid exciting force on a high head pump-turbine runner. *Proc. 4th Int. Symp. on Transport Phenomena and Dynamics of Rotating Machinery*, **B**, 133–142.
- Moore, R.D. and Meng, P.R. (1970a). Thermodynamic effects of cavitation of an 80.6° helical inducer operated in hydrogen. *NASA TN D-5614*.
- Moore, R.D. and Meng, P.R. (1970b). Effect of blade leading edge thickness on cavitation performance of 80.6° helical inducers in hydrogen. *NASA TN D5855*.
- Mueller, N.H.G. (1964). Water jet pump. *Proc. ASCE*, **90**, HY3, Pt.1, 83-112.
- Murai, H. (1968). Observations of cavitation and flow patterns in an axial flow pump at low flow rates (in Japanese). *Mem. Inst. High Speed Mech., Tohoku Univ.*, **24**, No.246, 315–333.
- Murakami, M. and Minemura, K. (1977). Flow of air bubbles in centrifugal impellers and its effect on the pump performance. *Proc. 6th Australasian Hydraulics and Fluid Mechanics Conf.*, **1**, 382–385.
- Murakami, M. and Minemura, K. (1978). Effects of entrained air on the performance of a horizontal axial-flow pump. In *Polyphase Flow in Turbomachinery* (editors, C.E. Brennen, P. Cooper and P.W. Runstadler, Jr.), ASME, 171–184.
- Myles, D.J. (1966). A design method for mixed flow pumps and fans. *Proc. Symp. on Pump Design, Testing and Operation, Nat. Eng. Lab., Scotland*, 167–176.
- NASA. (1970). Prevention of coupled structure-propulsion instability. *NASA SP-8055*.
- Natanzon, M.S., Bl'tsev, N.E., Bazhanov, V.V., and Leydervarger, M.R. (1974). Experimental investigation of cavitation-induced oscillations of helical inducers. *Fluid Mech., Soviet Res.*, **3**, No.1, 38–45.
- Naude, C.F. and Ellis, A.T. (1961). On the mechanism of cavitation damage by non-hemispherical cavities in contact with a solid boundary. *ASME. J. Basic Eng.*, **83**, 648–656.
- Newkirk, B.L. and Taylor, H.D. (1925). Shaft whipping due to oil action in journal bearing. *General Electric Review, Aug. 1925*, 559–568.

- Ng, S.L. and Brennen, C.E. (1978). Experiments on the dynamic behavior of cavitating pumps. *ASME J. Fluids Eng.*, **100**, No. 2, 166–176.
- Nordmann, R. and Massmann, H. (1984). Identification of dynamic coefficients of annular turbulent seals. *Proc. Workshop on Rotordynamic Instability Problems in High-Performance Turbomachinery, NASA Conf. Publ. 2338*, 295–311.
- Nufrio, R., Schultz, A.N. and McKinnon, C.N., 1987, “Final report - reverse reduction gear/reversible converter coupling test and evaluation,” PM-1500B.
- Numachi, F. (1961). Cavitation tests on hydrofoils designed for accelerating flow cascade: Report 1. *ASME J. Basic Eng.*, **83**, Series D, 637–647.
- Numachi, F. (1964). Cavitation tests on hydrofoils designed for accelerating flow cascade: Report 3. *ASME J. Basic Eng.*, **86**, Series D, 543–555.
- Ohashi, H. and Shoji, H. (1984a). Theoretical study of fluid forces on whirling centrifugal impeller (in Japanese). *Trans. JSME*, **50**, No. 458 B, 2518–2523.
- Ohashi, H. and Shoji, H. (1984b). Lateral fluid forces acting on a whirling centrifugal impeller in vaneless and vaned diffuser. *Proc. Workshop on Rotordynamic Instability Problems in High Performance Turbomachinery, NASA Conf. Publ. 2338*, 109–122.
- Okamura, T. and Miyashiro, H. (1978). Cavitation in centrifugal pumps operating at low capacities. *ASME Symp. on Polyphase Flow in Turbomachinery*, 243–252.
- Omta, R. (1987). Oscillations of a cloud of bubbles of small and not so small amplitude. *J. Acoust. Soc. Amer.*, **82**, 1018–1033.
- Ooi, K.K. (1985). Scale effects on cavitation inception in submerged water jets: a new look. *J. Fluid Mech.*, **151**, 367–390.
- Oshima, M. and Kawaguchi, K. (1963). Experimental study of axial and mixed flow pumps. *Proc. IAHR Symp. on Cavitation and Hydraulic Machinery, Sendai, Japan*, 397–416.
- Otsuka, S., Tsujimoto, Y., Kamijo, K. and Furuya, O. (1996). Frequency dependence of mass flow gain factor and cavitation compliance of cavitating inducers. *ASME J. Fluids Eng.*, **118**, 400–408.
- Parkin, B.R. (1952). Scale effects in cavitating flow. *Ph.D. Thesis, Calif. Inst. of Tech., Pasadena*.
- Parkin, B.R. (1958). Experiments on circular-arc and flat plate hydrofoils. *J. Ship Res.*, **1**, 34–56.
- Parkin, B.R. (1962). Numerical data on hydrofoil response to non-steady motions at zero cavitation number. *J. Ship Res.*, **6**, 40–42.
- Patel, B.R. and Runstadler, P.W., Jr. (1978). Investigations into the two-phase flow behavior of centrifugal pumps. In *Polyphase Flow in Turbomachinery* (eds: C.E. Brennen, P. Cooper and P.W. Runstadler, Jr.), ASME, 79–100.
- Pearsall, I.S. (1963). Supercavitation for pumps and turbines. *Engineering (GB)*, **196(5081)**, 309–311.
- Pearsall, I.S. (1966-67). Acoustic detection of cavitation. *Proc. Inst. Mech. Eng.*, **181**, No. 3A.
- Pearsall, I.S. (1972). *Cavitation*. Mills & Boon Ltd., London.
- Pearsall, I.S. (1978). Off-design performance of pumps. *von Karman Inst. for Fluid Dynamics, Lecture Series 1978-3*.

- Peterson, F.B., Danel, F., Keller, A.P., and Lecoffre, Y. (1975). Determination of bubble and particulate spectra and number density in a water tunnel with three optical techniques. *Proc. 14th Int. Towing Tank Conf., Ottawa*, **2**, 27–52.
- Peck, J.F. (1966). Written discussion in *Proc. Symp. on Pump Design, Testing and Operation, Nat. Eng. Lab., Scotland*, 256–273.
- Pfleiderer, C. (1932). *Die Kreiselpumpen*. Julius Springer, Berlin.
- Pinkus, O. and Sternlicht, B. (1961). *Theory of hydrodynamic lubrication*. McGraw-Hill, New York.
- Platzer, M. F. (1978). Unsteady flows in turbomachines—a review of current developments. *AGARD Rept. CP-227*.
- Plesset, M.S. (1949). The dynamics of cavitation bubbles. *ASME J. Appl. Mech.*, **16**, 228–231.
- Plesset, M.S. and Chapman, R.B. (1971). Collapse of an initially spherical vapor cavity in the neighborhood of a solid boundary. *J. Fluid Mech.*, **47**, 283–290.
- Plesset, M.S. and Prosperetti, A. (1977). Bubble dynamics and cavitation. *Ann. Rev. Fluid Mech.*, **9**, 145–185.
- Pollman, E., Schwerdtfeger, H., and Termuehlen, H. (1978). Flow excited vibrations in high pressure turbines (steam whirl). *ASME J. Eng. for Power*, **100**, 219–228.
- Raabe, J. (1985). *Hydro Power*. VDI-Verlag GmbH, Dusseldorf.
- Rains, D.A. (1954). Tip clearance flows in axial flow compressors and pumps. *Calif. Inst. of Tech. Hydro. and Mech. Eng. Lab. Report, No. 5*.
- Rayleigh, Lord. (1917). On the pressure developed in a liquid during the collapse of a spherical cavity. *Phil. Mag.*, **34**, 94–98.
- Rohatgi, U.S. (1978). Pump model for two-phase transient flow. In *Polyphase Flow in Turbomachinery* (eds: C.E. Brennen, P. Cooper and P.W. Runstadler, Jr.), ASME, 101–120.
- Rosenmann, W. (1965). Experimental investigations of hydrodynamically induced shaft forces with a three bladed inducer. *Proc. ASME Symp. on Cavitation in Fluid Machinery*, 172–195.
- Roudebush, W.H. (1965). Potential flow in two-dimensional cascades. *Aerodynamic design of axial flow compressors, NASA SP-36*, 101–149.
- Roudebush, W.H. and Lieblein, S. (1965). Viscous flow in two-dimensional cascades. *Aerodynamic design of axial flow compressors, NASA SP-36*, 151–181.
- Rubin, S. (1966). Longitudinal instability of liquid rockets due to propulsion feedback (Pogo). *J. Spacecraft and Rockets*, **3**, No.8, 1188–1195.
- Ruggeri, R.S. and Moore, R.D. (1969). Method for prediction of pump cavitation performance for various liquids, liquid temperatures, and rotative speeds. *NASA TN D-5292*.
- Sabersky, R.H., Acosta, A.J. and Hauptmann, E. (1971). *Fluid flow*. Macmillan, NY.
- Sack, L.E. and Nottage, H.B. (1965). System oscillations associated with cavitating inducers. *ASME J. Basic Eng.*, **87**, 917–924.
- Salemann, V. (1959). Cavitation and NPSH requirements of various liquids. *ASME J. Basic Eng.*, **81**, 167–180.

- Sanger, N.L. (1968a). Noncavitating performance of two low area ratio water jet pumps having throat lengths of 7.25 diameters. **NASA TN D-4445**.
- Sanger, N.L. (1968b). Noncavitating and cavitating performance of several low area ratio water jet pumps having throat lengths of 3.54 diameters. **NASA TN D-5095**.
- Samoylovich, G.S. (1962). On the calculation of the unsteady flow around an array of arbitrary profiles vibrating with arbitrary phase shift. *Prikladnaya Matematika i Mekhanika*, No.4.
- Schoeneberger, W. (1965). Cavitation tests in radial pump impellers. *Ph.D. Thesis, Tech. Univ. Darmstadt*.
- Schorr, B. and Reddy, K.C. (1971). Inviscid flow through cascades in oscillatory and distorted flow. *AIAA J.*, **9**, 2043–2050.
- Schulz, H., Greim, R. and Volgmann, W., 1996, “Calculation of three-dimensional viscous flow in hydrodynamic torque converters,” *ASME J. Fluids Eng.*, **118**, pp. 578–589.
- Shima, A., Takayama, K., Tomita, Y., and Muira, N. (1981). An experimental study on effects of a solid wall on the motion of bubbles and shock waves in bubble collapse. *Acustica*, **48**, 293–301.
- Shoji, H. and Ohashi, H. (1980). Fluid forces on rotating centrifugal impeller with whirling motion. *Proc. First Workshop on Rotordynamic Instability Problems in High-Performance Turbomachinery, NASA Conf. Pub. 2133*, 317–328.
- Silberman, E. (1959). Experimental studies of supercavitating flow about simple two-dimensional bodies in a jet. *J. Fluid Mech.*, **5**, 337–354.
- Silberman, E. and Song, C.S. (1961). Instability of ventilated cavities. *J. Ship Res.*, **5**, 13–33.
- Sisto, F. (1953). Stall-flutter in cascades. *J. Aero. Sci.*, **20**, 598–604.
- Sisto, F. (1967). Linearized theory of non-stationary cascades at fully stalled or supercavitating conditions. *Zeitschrift fur Angewandte Mathematik und Mechanik*, **8**, 531–542.
- Sisto, F. (1977). A review of the fluid mechanics of aeroelasticity in turbomachines. *ASME J. Fluids Eng.*, **99**, 40–44.
- Sloteman, D.P., Cooper, P., and Dussourd, J.L. (1984). Control of backflow at the inlets of centrifugal pumps and inducers. *Proc. Int. Pump Symp., Texas A&M Univ.*, 9–22.
- Sloteman, D.P., Cooper, P., and Graf, E. (1991). Design of high-energy pump impellers to avoid cavitation instabilities and damage. *Proc. EPRI Power Plant Symp., Tampa, Fl., June 1991*.
- Song, C.S. (1962). Pulsation of ventilated cavities. *J. Ship Res.*, **5**, 8–20.
- Soyama, H., Kato, H., and Oba, R. (1992). Cavitation observations of severely erosive vortex cavitation arising in a centrifugal pump. *Proc. Third I.Mech.E. Int. Conf. on Cavitation*, 103–110.
- Sparks, C.R. and Wachel, J.C. (1976). Pulsations in liquid pumps and piping systems. *Proc. 5th Turbomachinery Symp.*, 55–61.
- Spraker, W.A. (1965). The effect of fluid properties on cavitation in centrifugal pumps. *ASME J. Eng. Power*, **87**, 309–318.
- Stahl, H.A. and Stepanoff, A.J. (1956). Thermodynamic aspects of cavitation in centrifugal pumps. *Trans. ASME*, **78**, 1691–1693.

- Stanitz, J.D. (1952). Some theoretical aerodynamic investigations of impellers in radial- and mixed- flow centrifugal compressors. *Trans. ASME*, **74**, 473–497.
- Stepanoff, A.J. (1948). *Centrifugal and axial flow pumps*. John Wiley & Sons, Inc.
- Stepanoff, A.J. (1961). Cavitation in centrifugal pumps with liquids other than water. *ASME J. Eng. Power*, **83**, 79–90.
- Stepanoff, A.J. (1964). Cavitation properties of liquids. *ASME J. Eng. Power*, **86**, 195–200.
- Stockman, N.O. and Kramer, J.L. (1963). Method for design of pump impellers using a high-speed digital computer. *NASA TN D-1562*.
- Stripling, L.B. and Acosta, A.J. (1962). Cavitation in turbopumps - Part I. *ASME J. Basic Eng.*, **84**, 326–338.
- Stripling, L.B. (1962). Cavitation in turbopumps - Part II. *ASME J. Basic Eng.*, **84**, 339–350.
- Strub, R.A. (1963). Pressure fluctuations and fatigue stresses in storage pumps and pump-turbines. *ASME Paper No. 63-AHGT-11*.
- Stodola, A. (1927). *Steam and gas turbines. Volumes I and II*. McGraw-Hill, New York.
- Sturge, D.P. and Cumpsty, N.A. (1975). Two-dimensional method for calculating separated flow in a centrifugal impeller. *ASME J. Fluids Eng.*, **97**, 581–579.
- Sutherland, C.D. and Cohen, H. (1958). Finite cavity cascade flow. *Proc. 3rd U.S. Nat. Cong. of Appl. Math.*, 837–845.
- Swanson, W.M. (1953). Complete characteristics circle diagram for turbomachinery. *Trans. ASME*, **75**, 819–826.
- Thiruvengadam, A. (1967). The concept of erosion strength. Erosion by cavitation or impingement. *ASTM STP 408, Am. Soc. Testing Mats.*, 22.
- Thiruvengadam, A. (1974). Handbook of cavitation erosion. *Tech. Rep. 7301-1, Hydronautics, Inc., Laurel, Md.*
- Thompson, W.E. (1978). Fluid dynamic excitation of centrifugal compressor rotor vibrations. *ASME J. Fluids Eng.*, **100**, No. 1, 73–78.
- Tsujimoto, Y., Imaichi, K., Tomohiro, T., and Gato, M. (1986). A two-dimensional analysis of unsteady torque on mixed flow impellers. *ASME J. Fluids Eng.*, **108**, No. 1, 26–33.
- Tsujimoto, Y., Acosta, A.J., and Brennen, C.E. (1988). Theoretical study of fluid forces on a centrifugal impeller rotating and whirling in a volute. *ASME J. Vibration, Acoustics, Stress and Reliability in Design*, **110**, 263–269.
- Tsujimoto, Y., Kamijo, K., and Yoshida, Y. (1992). A theoretical analysis of rotating cavitation in inducers. *ASME Cavitation and Multiphase Flow Forum, FED* **135**, 159–166.
- Tsujimoto, Y., Kamijo, K. and Yoshida, Y. (1993). A theoretical analysis of rotating cavitation in inducers. *ASME J. Fluids Eng.*, **115**, 135–141.
- Tsukamoto, H. and Ohashi, H. (1982). Transient characteristics of centrifugal turbomachines. *ASME J. Fluids Eng.*, **104**, No. 1, 6–14.

- Tulin, M.P. (1953). Steady, two-dimensional cavity flows about slender bodies. *Tech. Rep. 834*, David Taylor Model Basin.
- Tulin, M.P. (1964). Supercavitating flows - small perturbation theory. *J. Ship Res.*, **7**, No. 3, 16–37.
- Tyler, J.M. and Sofrin, T.G. (1962). Axial compressor noise studies. *Soc. Automotive Eng.*, **70**, 309–332.
- Vaage, R.D., Fidler, L.E., and Zehnle, R.A. (1972). Investigation of characteristics of feed system instabilities. *Final Rept. MCR-72-107, Martin Marietta Corp., Denver, Col.*
- Vance, J.M. (1988). *Rotordynamics of turbomachinery*. John Wiley and Sons, New York.
- van der Braembussche, R. (1982). Rotating stall in vaneless diffusers of centrifugal compressors. *von Karman Inst. for Fluid Dyn., Technical Note 145*.
- Verdon, J.M. (1985). Linearized unsteady aerodynamic theory. *United Technologies Research Center Report R85-151774-1*.
- Wachter, J. and Benckert, H. (1980). Flow induced spring coefficients of labyrinth seals for application in rotordynamics. *Proc. Workshop on Rotordynamic Instability problems in High Performance Turbomachinery, NASA Conf. Publ. 2133*, 189–212.
- Wade, R.B. and Acosta, A.J. (1966). Experimental observations on the flow past a planoconvex hydrofoil. *ASME J. Basic Eng.*, **88**, 273–283.
- Wade, R.B. (1967). Linearized theory of a partially cavitating cascade of flat plate hydrofoils. *Appl. Sci. Res.*, **17**, 169–188.
- Wade, R.B. and Acosta, A.J. (1967). Investigation of cavitating cascades. *ASME J. Basic Eng., Series D*, **89**, 693–706.
- Warnock, J.E. (1945). Experiences of the Bureau of Reclamation. *Proc. Amer. Soc. Civil Eng.*, **71**, No.7, 1041–1056.
- Watanabe, S., Tsujimoto, Y., Kamijo, K. and Furuya, O. (1998). An analysis of cavitation characteristics by singularity method. (in Japanese), *Trans. JSME, Series B*, **64-621**, 1285-1292.
- Watanabe, S., Sato, K., Tsujimoto, Y. and Kamijo, K. (1999). Analysis of rotating cavitation in a finite pitch cascade using a closed cavity model. *ASME J. Fluids Eng.*, **121**, No.4, pp. 834-840.
- Weitendorf, E.A. (1989). 25 years research on propeller excited pressure fluctuations and cavitation *Proc. ASME Int. Symp. On Cavitation Noise and Erosion in Fluid Systems, FED-18*, 1-10.
- Wellman-Seaver-Morgan Co. (1915). *Hydraulic Turbines*. Catalog of the Wellman-Seaver-Morgan Co., Cleveland, Ohio (available online).
- White, F.M. (1979). *Fluid mechanics*. McGraw-Hill, Inc.
- Whitehead, D. (1960). Force and moment coefficients for vibrating airfoils in cascade. *ARC R&M 3254, London*.
- Wiesner, F.J. (1967). A review of slip factors for centrifugal impellers. *ASME J. Eng. for Power*, **89**, 558–576.
- Wijdieks, J. (1965). Greep op het ongrijpbare—II. Hydraulische aspecten bij het ontwerpen van pomplastaties. *Delft Hydraulics Laboratory Publ. 43*.
- Wislicenus, G.F. (1947). *Fluid mechanics of turbomachinery*. McGraw-Hill, New York.

- Wood, G.M. (1963). Visual cavitation studies of mixed flow pump impellers. *ASME J. Basic Eng.*, Mar. 1963, 17–28.
- Woods, L.C. (1955). On unsteady flow through a cascade of airfoils. *Proc. Roy. Soc. A*, **228**, 50–65.
- Woods, L.C. (1957). Aerodynamic forces on an oscillating aerofoil fitted with a spoiler. *Proc. Roy. Soc. A*, **239**, 328–337.
- Woods, L.C. (1961). *The theory of subsonic plane flow*. Cambridge Univ. Press.
- Woods, L.C. and Buxton, G.H.L. (1966). The theory of cascade of cavitating hydrofoils. *Quart. J. Mech. Appl. Math.*, **19**, 387–402.
- Worster, R.C. (1963). The flow in volutes and its effect on centrifugal pump performance. *Proc. Inst. of Mech. Eng.*, **177**, No. 31, 843–875.
- Wu, T.Y. (1956). A free streamline theory for two-dimensional fully cavitated hydrofoils. *J. Math. Phys.*, **35**, 236–265.
- Wu, T.Y. (1962). A wake model for free streamline flow theory, Part 1. Fully and partially developed wake flows and cavity flows past an oblique flat plate. *J. Fluid Mech.*, **13**, 161–181.
- Wu, T.Y. and Wang, D.P. (1964). A wake model for free streamline flow theory, Part 2. Cavity flows past obstacles of arbitrary profile. *J. Fluid Mech.*, **18**, 65–93.
- Wu, T.Y. (1972). Cavity and wake flows. *Ann. Rev. Fluid Mech.*, **4**, 243–284.
- Yamada, Y. (1962). Resistance of flow through an annulus with an inner rotating cylinder. *Bull. JSME*, **5**, No. 18, 302–310.
- Yamamoto, K. (1991). Instability in a cavitating centrifugal pump. *JSME Int. J., Ser. II*, **34**, 9–17.
- Yoshida, Y., Murakami, Y., Tsurusaki, T., and Tsujimoto, Y. (1991). Rotating stalls in centrifugal impeller/vaned diffuser systems. *Proc. First ASME/JSME Joint Fluids Eng. Conf.*, **FED-107**, 125–130.
- Young, W.E., Murphy, R., and Reddecliff, J.M. (1972). Study of cavitating inducer instabilities. *Pratt and Whitney Aircraft, Florida Research and Development Center, Rept. PWA FR-5131*.
- Zekas, B.M. and Schultz, A.N., 1997, “Unique reverse and maneuvering features of the AOE-6 reverse reduction gear,” *ASME Paper No. 97-GT-515*.