VITA

Kenneth S. Brentner

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Educational Background

1991 Doctor of Philosophy, Department of Engineering – Acoustics
University of Cambridge, Corpus Christi College,
Cambridge, CB2-1RH, United Kingdom
Advisor: Professor J. E. Ffowcs Williams

1987 Master of Science, Aeronautical Engineering
The George Washington University, Joint Institute for the Advancement of Flight Sciences (JIAFS)
NASA Langley Research Center
Hampton, VA 23681-0001

1983 Bachelor of Science in Aeronautical and Astronautical Engineering
(with highest distinction)
School of Aeronautics and Astronautics, Purdue University
West Lafayette, IN 47907

Employment Experience

00-present Professor with experience and expertise in helicopter acoustics, rotor source noise prediction, computational aeroacoustics, computational fluid dynamics, aerodynamics, high-speed impulsive noise, and airframe noise. Developed maneuvering rotorcraft noise prediction code PSU-WOPWOP. (Associate Professor from July 2000-June 2007)

98-00 Senior Research Engineer in rotorcraft acoustics and computational aeroacoustics in the Aerodynamics and Aerothermodynamics Competency at NASA Langley Research Center. Responsible for independent analytical and computational research in rotorcraft source noise prediction and airframe noise prediction and propagation. Primary engineer responsible for development and implementation of acoustic analogy based methods for noise propagation. Contracting Officer's Technical Representative and Technical Monitor for several NASA contracts and grants.

89-98 Research Engineer in rotorcraft acoustics and computational aeroacoustics in the Fluid Mechanics and Acoustics Division at NASA Langley Research Center. Responsible for analytical research on source noise and the underlying time-dependent aerodynamics of helicopter rotor systems. Primary research engineer responsible for high-speed impulsive noise prediction theory and algorithm development and implementation. Acoustics representative on the LaRC Acoustics Technical Committee (1992-1994). Technical monitor for several NASA contracts and grants.

91-99 Graduate Student Advisor for masters degree students studying at George Washington University (JIAFS). See student information below.

94-95 Adjunct Professor at Hampton University. Taught graduate level course on partial differential equations for two semesters in the Department of Mathematics.

87-89 Graduate Student on leave from NASA Langley at the University of Cambridge for doctoral studies in acoustics.

83-87 Research Engineer in the Acoustics Division, NASA Langley Research Center. Conducted research in discrete frequency noise prediction of helicopter rotor and propeller noise. Developed the widely used rotor noise prediction program, WOPWOP, based upon the time domain theory of Farassat.

83 Research Assistant at Purdue University. Developed a code to predict unsteady propeller noise.

79-83 Cooperative Education Student at NASA Langley Research Center. Worked five semesters in areas ranging from facilities development, supersonic transport and missile analysis, and subsonic wind tunnel testing. Conducted the initial computations showing a potential wave drag benefit for twin fuselage supersonic transport configurations and designed a wind tunnel model to validate these calculations.

Professional Affiliations and Service

American Institute of Aeronautics and Astronautics

–Associate Fellow (member since 1978).

–Session Chairman (many times – Aeroacoustics Conference; Aerospace Sciences Meeting)

– member of Meshing, Visualization, and Computer Environments Technical Committee (2001-2006)

– member of Terrestrial Energy Systems Technical Committee (2004-2006)

– member of Aeroacoustics Technical Committee (2007 – present)

– Co-Technical Chair of 2011 Aeroacoustic Conference, Portland, OR, June 6-8, 2011

American Helicopter Society - member since 1990.

–NASA Langley Representative on the Acoustics Technical Committee 1990-1993.

–1992 Acoustics Technical Committee highlights editor

–1993 AHS Forum and Technology Display session chairman for Acoustics Session.

–1995 Session chairman at 2nd International Aeromechanics Specialists' Conference

– Associate Editor for Acoustics for the Journal of the American Helicopter Society (May 1998 – April 2007)

– Editor in Chief of the Journal of the American Helicopter Society, (April 2007-May 2010)

–Penn State Representative on the Acoustics Technical Committee 2000-2010, Deputy Chairman (2006-2008), Chairman (2008-2010).

American Society of Engineering Education, Member, 2000-present.

Graduate Students Supervised

Advised more than 29 students. Second student, Peter C. Holland, was the Abe M. Zarem Award for Distinguished Achievement 1996 winner (national AIAA graduate student paper competition) and the McCarthy Award for Best Student Paper winner at the International Congress of the Aeronautical Sciences Meetings held September 1996 in Sorento, Italy.

Courses Taught

Title	Level	Semester
Partial Differential Equations	Graduate level	Fall 1994, Spring 1995
Foundations of Fluid Mechanics	Graduate level	Fall 2000 Fall 2002 Fall 2007
Aerodynamics II – Viscous and compressible flow	Undergraduate	Spring 2001, Spring 2002 Spring 2004
Aerospace Analysis	Undergraduate	Fall 2001 Fall 2002 Fall 2003 Fall 2004
Mechanics of Fluids	Undergraduate	Spring 2003 Spring 2004 Spring 2006 Spring 2008
Aerodynamically Induced Noise	Graduate level	Fall 2004 Fall 2006 Fall 2010
Aerodynamics of V/STOL Aircraft	Undergraduate & Graduate	Fall 2005 Fall 2006 Fall 2009 Fall 2010
Introduction to Numerical Methids in Fluid Dynamics	Undergraduate & Graduate	Spring 2007 Spring 2010 Spring 2011

Publications

1. Archival Publications*

* Refereed publications (peer reviewed by multiple reviewers).

1.1 Wood, Richard M.; Miller, David S.; and Brentner, Kenneth S.: Theoretical and Experimental Investigation of Supersonic Aerodynamic Characteristics of a Twin-Fuselage Concept. NASA TP-2184, August 1983.

1.2 Brentner, Kenneth S.: Prediction of Helicopter Discrete Frequency Noise - A Computer Program Incorporating Realistic Blade Motions and Advanced Acoustic Formulation. NASA TM-87721, October 1986.

1.3 Farassat, F. and Brentner, Kenneth S.: The Uses and Abuses of the Acoustic Analogy in Helicopter Rotor Noise Prediction. *Journal of the American Helicopter Society*, Vol. 33, No. 1, pp. 29-36, January 1988.

1.4 Brentner, Kenneth S.: A Prediction of Helicopter Rotor Discrete Frequency Noise for Three Scale Models. *Journal of Aircraft*, Vol. 25, No. 5, pp. 420-427, May 1988

1.5 Brentner, Kenneth S.: Using Finite Volume Methods for Aeroacoustics. in Computational Acoustics - Scattering, Gaussian Beams, and Aeroacoustics, D. Lee, A. Cakmak, and R. Vichnevetsky, editors, North Holland, 1990, pp. 269-281.

1.6 Brentner, Kenneth S.: Acoustics-1991-92 AHS Technical Committee Report. *Vertiflite*, Volume 38, No. 3, May-June 1992, pp. 68-71.

1.7 Brentner, Kenneth S.: Energy Considerations in Computational Aeroacoustics. in Computational Acoustics - Acoustic Propagation, D. Lee, R. Vichnevetsky, and A. R. Robinson, editors, North Holland, 1993, pp. 149-184.

1.8 Brentner, Kenneth S.: A Consideration of Energy from the Viewpoint of Computational Aeroacoustics. in Computational Aeroacoustics, J. C. Hardin, and M. Y. Hussaini, editors, Springer-Verlag, 1993, pp. 307-324.

1.9 Brentner, Kenneth S.: Direct numerical calculation of acoustics: solution evaluation through energy analysis. *Journal of Fluid Mechanics*, Vol. 254, pp. 267-281, 1993.

1.10 Brentner, Kenneth S. and Farassat, F.: Helicopter Noise Prediction: The Current Status and Future Direction. *Journal of Sound and Vibration,* Vol. 170, No. 5, pp. 79-96, September 1993.

1.11 Brentner, Kenneth S., Michael A. Marcolini, and Casey L. Burley: Sensitivity of Acoustic Prediction to Variation of Input Parameters. *Journal of the American Helicopter Society*, Vol. 39, No. 3, pp. 43-52, July 1994.

1.12 Lockard, David P., Brentner, Kenneth S., and Atkins, Harold L.: High Accuracy Algorithms for Computational Aeroacoustics. *AIAA Journal*, Vol. 33, No. 2, pp. 246-251, February 1995.

1.13 Brentner, Kenneth S., and Holland, Peter C.: An Efficient and Robust Method for Computing Quadrupole Noise. *Journal of the American Helicopter Society*, Vol. 42, No 2, pp. 172-181, April 1997.

1.14 Brentner, Kenneth S.: An Efficient and Robust Method for Predicting Helicopter Rotor High-Speed Impulsive Noise. *Journal of Sound and Vibration*, Vol. 203, No. 1, pp. 87-100, May 29, 1997.

1.15 Brentner, Kenneth S.: Numerical Algorithms for Acoustic Integrals With Examples for Rotor Noise Prediction. *AIAA Journal*, Vol. 35, No. 4, April 1997.

1.16 Brentner, Kenneth S.; Lyrintzis, Anastasios S.; and Koutsavdis, Evangelos K.: A Comparison of Computational Aeroacoustic Prediction Methods for Transonic Rotor Noise. *Journal of Aircraft*, Vol. 34, No. 4, July-August 1997

1.17 Farassat, F.; and Brentner Kenneth S.: The Acoustic Analogy and Prediction of the Noise of Rotating Blades. *Theoretical and Computational Fluid Dynamics*, Vol. 10, No. 1-4, pp. 155-170, January 1998.

1.18 Brentner, Kenneth S.; and Farassat, F.: Analytical Comparison of the Acoustic Analogy and Kirchhoff Formulation for Moving Surfaces. *AIAA Journal*, Vol. 36, No. 8, pp. 1379-1386, August 1998.

1.19 Farassat, F.; and Brentner, Kenneth S.: Supersonic Quadrupole Noise Theory for High-Speed Helicopter Rotors. *Journal of Sound and Vibration*, Vol. 218, No. 3, pp. 481-500, December 1998.

1.20 Cox, Jared S; Brentner, Kenneth S.; and Rumsey, Christopher L: Computation of Vortex Shedding and Radiated Sound for a Circular Cylinder: Subcritical to Transcritical Reynolds Numbers. *Theoretical and Computational Fluid Dynamics*,Vol. 12, No. 3, pp. 233-253, 1998.

1.21 Singer, Bart A.; Brentner, Kenneth S.; Lockard, David P.; and Lilley, Geoffrey M.: Simulation of Acoustic Scattering from a Trailing Edge. *Journal of Sound and Vibration*, Vol. 230, No. 3, pp. 541-560, 2000.

1.22 Singer, Bart A.; Lockard, David P.; Brentner, Kenneth S.: Computational Aeroacoustics Analysis of Slat Trailing-Edge Flow. *AIAA Journal*, Vol.38, No. 9, pp. 1558–1564, September 2000.

1.23 Brentner, Kenneth S; and Farassat F., Modeling Aerodynamically Generated Sound of Helicopter Rotors. *Progress in Aerospace Sciences*, Vol. 39, No.2–3, pp. 83–120, February 2003.

1.24 Brès, G.A., Brentner, K.S., Perez, G., and Jones, H.E.: Maneuvering Rotorcraft Noise Prediction. *Journal of Sound and Vibration*, Vol. 275, No.3-5, August 2003, pp. 719-738.

1.25 Sullivan, B.M., Edwards, B.D., Brentner, K.S., and Booth, E.R., Jr.: A Subjective Test of Modulated Blade Spacing for Helicopter Main Rotors. *Journal of the American Helicopter Society*, Vol. 50, No. 1, January 2005, pp. 26-32.

1.26 Brentner, K.S., Edwards, B.D., Riley, R., and Schillings, J.: Predicted Noise for a Main Rotor with Modulated Blade Spacing. *Journal of the American Helicopter Society*, Vol. 50, No. 1, January 2005, pp. 18-25.

1.27 Morris, P.J., Long, L.N., and Brentner, K.S.: An Aeroacoustic Analysis of Wind Turbines. Proceedings of the 23rd ASME Wind Energy Symposium and AIAA-2004-1184, Reno, NV, January 5-8, 2004

1.28 Perez, G.*, Brentner, K.S., Brès ,G.A.*, and Jones, H.E.: A First Step Toward the Prediction of Rotorcraft Maneuver Noise. *Journal of the American Helicopter Society*, Vol. 50, No. 3, June 2005, pp. 230-237.

1.29 Viswanath, K., Brentner, K.S., Gimelshein, S.F, Levin, D.A.: Investigation of Soot Combustion in Underexpanded Jet Plume Flows. *Journal of Thermophysics and Heat Transfer*, Vol. 19, No. 3, July-September, 2005. pp 282-293.

1.30 Brentner, K.S., Lopes, L.V., Chen, H.-N., and Horn, J.F.: Near Real-Time Simulation of Rotorcraft Acoustics and Flight Dynamics. *Journal of Aircraft*, Vol. 42, No. 2, March-April 2005, pp. 347-355.

1.31 Horn, J.F., Bridges, D.O., Lopes, L.V., Brentner, K.S.: Development of a Low-Cost Multi-Disciplinary Rotorcraft Simulation Facility. *Journal of Aerospace Computing, Information and Communication*, July 2005, pp. 267-284.

1.32 Chen, H.N., Brentner, K.S., Lopes, L.V., and Horn, J.F.: An Initial Analysis of Transient Noise in Rotorcraft Maneuvering Flight. *International Journal of Aeroacoustics*, Vol. 5, No. 2, April 2006, pp. 109-138.

1.33 Chen, H.N., Brentner, K.S., Anathan, S., and Leishman, J.G., "A Computational Study of Helicopter Rotor Wakes and Noise Generated During Transient Maneuvers," *Journal of the American Helicopter Society*, Vol. 52, No. 1, 2008, pp. 37-55.

1.34 Lee, S., Brentner, K.S., Farassat, F., and Morris, P.J., "Analytical Formulation and Numerical Implementation of an Acoustic Pressure Gradient Prediction," *Journal of Sound and Vibration, Vol.* 319, January 2009, pp. 1200-1221. Available online July 31, 2008, doi:10.1016/j.jsv.2008.06.028.

1.35 Hennes, C.C., and Brentner, K.S., "The Effect of Blade Deformation on Rotorcraft Acoutics," *Journal of the American Helicopter Society*, Vol. 53, No. 4, October, 2008, pp. 398-411.

1.36 Cheng, R., Morris, P.J., and Brentner, K.S., "A three dimensional parabolic equation method for sound propagation in moving inhomogeneous media," *Journal of the Acoustical Society of America*, Vol. 126, No. 3, October 2009, DOI: 10.1121/1.3203934, 11 pages.

1.37 Lee, S., Erwin, J. P. , and Brentner, K. S., "A Method to Predict Acoustic Scattering of Rotorcraft Noise," *Journal of the American Helicopter Society*, Vol. 54, No. 4, October 2009, DOI: 10.4050/JAHS.54.042007, 15 pages.

1.38 Lee, S., Morris, P. J., and Brentner, K. S., "Improved Algorithm for Nonlinear Sound Propagation with Aircraft and Helicopter Noise Applications," *AIAA Journal*, vol.48 no.11, November, 2010, pp. 2586-2595, doi: 10.2514/1.52437.

1.39 Lee, S.*, Brentner, K. S., and Morris, P. J., "Acoustic Scattering in the Time Domain Using an Equivalent Source Method," *AIAA Journal*, vol.48 no.12, December 2010, pp. 2772-2780, doi: 10.2514/1.45132.

1.40 Lopes, L. V.*, Brentner, K. S., and Morris, P. J., "Framework for a Landing-Gear Model and Acoustic Prediction," *Journal of Aircraft*, vol.47 no.3, May-June 2010, pp. 763-774, doi: 10.2514/1.36925.

2. Conference Publications

2.1 Brentner, Kenneth S.: A Prediction of Helicopter Rotor Discrete Frequency Noise for Three Scale Models Using a New Acoustics Program. AIAA Paper 87-0252, presented at the AIAA 25th Aerospace Sciences Meeting, Reno, NV January 12-15, 1987.

2.2 Farassat, F.; and Brentner, Kenneth S.: The Uses and Abuses of the Acoustic Analogy to Helicopter Rotor Noise Prediction. Presented at the AHS National Specialists' Meeting on Aerodynamics and Acoustics, February 25-27, 1987.

2.3 Brentner, Kenneth S.: The Exact Calculation of Quadrupole Sources for Some Incompressible Flows. Presented at the 1988 Spring Conference Acoustics 1988, University of Cambridge, April 5-8, 1988, Proceedings of Institute of Acoustics, Vol. 10, Part 2, pp. 817-824. Also NASA TM-100623, May 1988.

2.4 Brentner, Kenneth S.; Michael A. Marcolini; and Casey L. Burley: Sensitivity of Acoustic Prediction to Variation of Input Parameters. AHS Technical Specialists Meeting - Rotorcraft Acoustics and Fluid Dynamics, Philadelphia, PA, October 15-16, 1991.

2.5 Farassat, F. and Brentner, Kenneth S.: The Influence of Quadrupole Sources in the Boundary Layer and Wake of a Blade on Helicopter Rotor Noise. International Technical Specialist Meeting, October 15-17, 1991

2.6 Brentner, Kenneth S. and Farassat, F.: Helicopter Noise Prediction: The Current Status And Future Direction. Presented at the DGLR/AIAA 14th Aeroacoustics Conference. Aachen, Germany, May 11-14, 1992.

2.7. Lockard, David P.; Brentner, Kenneth S.; and Atkins, Harold L.: High Accuracy Algorithms for Computational Aeroacoustics. AIAA Paper 94-0460, presented at the AIAA 32nd Aerospace Sciences Meeting, Reno NV, January 10-13, 1994.

2.8 Brentner, Kenneth S.: A New Algorithm for Computing Acoustic Integrals. Proceedings of the IMACS 14th World Congress on Computational and Applied Mathematics, Atlanta, Georgia, July 11-15, 1994.

2.9 Brentner, Kenneth S., and Holland, Peter C.: An Efficient and Robust Method for Computing Quadrupole Noise. Presented at the American Helicopter Society 2nd International Aeromechanics Specialists' Conference, Bridgeport CT, October 11-13, 1995.

2.10 Brentner, Kenneth S.: An Efficient and Robust Method for Predicting Helicopter Rotor High-Speed Impulsive Noise. AIAA Paper 96-0151, presented at the AIAA 34th Aerospace Sciences Meeting, Reno, NV, January 15-18, 1996.

2.11 Brentner, Kenneth S.: Numerical Algorithms for Acoustic Integrals—the Devil is in the Details. AIAA Paper 96-1706, presented at the 2nd AIAA/CEAS Aeroacoustics Meeting, State College, PA, May 6-8, 1996.

2.12 Brentner, Kenneth S.; Lyrintzis, Anastasios S.; and Koutsavdis, Evangelos K.: A Comparison of Computational Aeroacoustic Prediction Methods for Transonic Rotor Noise. Presented at the American Helicopter Society 52nd Annual Forum, Washington, D. C., June 4-6, 1996.

2.13 Brentner, Kenneth S.; Cox, Jared S.; Rumsey, Christopher L.; and Younis, Bassam A.: Computation of Sound Generated by Flow Over a Circular Cylinder: An Acoustic Analogy Approach. Presented at the Second Computational Aeroacoustics (CAA) Workshop on Benchmark Problems, November 4-5, 1996

2.14 Brentner, Kenneth S.; and Farassat, F: An Analytical Comparison of the Acoustic Analogy and Kirchhoff Formulation for Moving Surfaces. Presented at American Helicopter Society 53rd Annual Forum, Virginia Beach, VA, April 29-May 1, 1997.

2.15 Cox, Jared S.; Rumsey, Christoper L.; Brentner, Kenneth S.; and Younis, Bassam A.: Computation of Sound Generated by Viscous Flow Over a Circular Cylinder. Presented at the ASME 4th International Symposium on Fluid-Structure Interactions, Aeroelasticity, Flow-Induced Vibration & Noise, held at the 1997 ASME Int'l Mech. Eng'g Congress & Exposition, November 16-21, 1997, Dallas, TX.

2.16 Farassat, F. and Brentner, Kenneth S. Supersonic Quadrupole Noise Theory for High-Speed Helicopter Rotors, presented at the American Helicopter Society Technical Specialists' Meeting for Rotor Acoustics and Aerodynamics, Williamsburg, VA, October 28-30, 1997.

2.17 Farassat, F.; Brentner, Kenneth S.; and Dunn, Mark H.: A Study of Supersonic Surface Sources—The Ffowcs Williams–Hakwings Equation and the Kirchhoff Formulation. AIAA Paper 98-2375. Presented at the 4th AIAA/CEAS Aeroacoustics Conference, Toulouse, France, June 2–4, 1998.

2.18 Singer, Bart A; Brentner, Kenneth S.; Lockard, David P.; and Lilley, Geoffrey M.: Simulation of Acoustic Scattering from a Trailing Edge. AIAA Paper 99-0231. Presented at the 37th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 11-14, 1999.

2.19 Singer, Bart A.; Lockard, David P.; Brentner, Kenneth S.; Khorrami, Mehdi R.; Berkman, Mert E.; and Choudhari, Meelan: Computational Aeroacoustics Analysis of Slat Trailing-Edge Flow. AIAA Paper 99-1802, Presented at the 5th AIAA/CEAS Aeroacoustics Conference, Seattle, WA, May 10-12, 1999.

2.20 Khorrami, Mehdi R.; Berkman, Mert E.; Choudhari, Meelan; Singer, Bart A.; Lockard, David P.; and Brentner Kenneth S.: Unsteady Flow Computations of a Slat with a Blunt Trailing Edge. AIAA Paper 99-1805, Presented at the 5th AIAA/CEAS Aeroacoustics Conference, Seattle, WA, May 10-12, 1999

2.21 Brentner, Kenneth S.: Modeling Aerodynamically Generated Sound: Recent Advances in Rotor Noise Prediction, AIAA-2000-0345, **invited** paper presented at the AIAA 38th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 10-14, 2000.

2.22 Long, Lyle N.; and Brentner, Kenneth S.: Self-Scheduling Parallel Methods for Multiple Serial Codes with Application to WOPWOP, AIAA-2000-0346, presented at the AIAA 38th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 10-14, 2000.

2.23 Brentner, Kenneth S.; and Jones, Henry E.: Noise Prediction for Maneuvering Rotorcraft, Presented at the 6th AIAA/CEAS Aeroacoustics Conference, Lahaina, Hawaii, June 12-14, 2000.

2.24 Brentner, Kenneth S.; Brès, Guillaume A.; Perez, Guillaume; and Jones, Henry E.: Maneuvering Rotorcraft Noise Prediction: A New Code for a New Problem, presented at the AHS Aerodynamics, Acoustics, and Test Evaluation Technical Specialists Meeting, San Francisco, CA, January 23-25, 2002.

2.25 Brentner, Kenneth S.; Perez Guillaume; Brès, Guillaume A.; and Jones, Henry E.: Toward A Better Understanding of Maneuvering Rotorcraft Nose, American Helicopter Society 58th Annual Forum Proceedings, Montreal, Canada, June 11–13, 2002.

2.26 Brentner, Kenneth S.; Edwards, Bryan, D.; Riley, Rick; and Schillings, John: Predicted Noise for a Main Rotor with Modulated Blade Spacing, American Helicopter Society 58th Annual Forum Proceedings, Montreal, Canada, June 11–13, 2002.

2.27 Sullivan, Brenda M.; Edwards, Bryan D.; Brentner, Kenneth S.; and Booth, Earl R. Jr.: A Subjective Test of Modulated Blade Spacing for Helicopter Main Rotors, American Helicopter Society 58th Annual Forum Proceedings, Montreal, Canada, June 11–13, 2002.

2.28 Brentner, K. S.; Gimelshein, S. F.; Levin, D. A.; Visawanath, K.: Investigation of Soot Combustion in Underexpanded Jet Plume Flows, AIAA 2000-0506, presented at the AIAA 41st Aerospace Sciences Meeting and Exhibit, Reno, NV, January 6-9, 2003.

2.29 Brentner, K. S.; Lopes, L.; Chen, H.; Horn, J. F.: Near Real-Time Simulation of Rotorcraft Acoustics and Flight Dynamics, American Helicopter Society 59th Annual Forum Proceedings, Phoenix, AZ, May 6–8, 2003.

2.30 Viswanath, K.*, Levin, D.A., Brentner, K.S., Gimelshein, S.F: Modeling of Soot Oxidation and Prediction of Optical Radiation in Underexpanded Plumes. AIAA-2004-1350, presented at the AIAA 42nd Aerospace Sciences Meeting and Exhibit, Reno, NV, January 5-8, 2004. (*Author supervised by KSB, Presented by student advisee)

2.31 Chen, H.N.*, Brentner, K.S., Lopes, L.V.*, Horn, J.F.: A Study of Rotorcraft Noise Prediction in Maneuvering Flight. AIAA-2004-0850, presented at the AIAA 42nd Aerospace Sciences Meeting and Exhibit, Reno, NV, January 5-8, 2004. (*Authors supervised by KSB, Presented by KSB)

2.32 Hennes, C.C.*, Chen, H.N.*, Brentner, K.S., Ananthan, S., and Leishman, J.G.: Influence of Transient Flight Maneuvers on Rotor Wake Dynamics and Noise Radiation. Proceedings of the AHS 4th Decennial Specialist's Conference on Aeromechanics, San Francisco, CA, Jan 21-23, 2004. (*Authors supervised by KSB, Presented by KSB)

2.33 Horn, J.F., Bridges, D.O., Sharma, C.*, Brentner, K. S., and Lopes, L.V.*: A Multi-Disciplinary Rotorcraft Simulation Facility Composed of Commodity Components and Open Source Software. American Helicopter Society 60th Annual Forum Proceedings, Baltimore, MD, June 8-10, 2004. (*Authors supervised by KSB)

2.34 Brentner, K. S., Real-Time and Maneuvering Flight Rotor Noise Prediction, International Symposium on Recent Advances in Aeroacoustics and Active Flow-Combustion

Control, Goa, India January 3-6, 2005. International Symposium on Recent Advances in Aeroacoustics and Active Flow-Combustion Control

2.35 Lopes, L.V., Brentner, K.S., Morris, P.J., Lockhard, D.P., and Lilley, G.M.: An Introduction to a Component Based Approach to Landing Gear Acoustics. 43rd Annual AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 10-13, 2005.

2.36 Cheng, R., Morris, P. J., and Brentner, K. S.: An Application of the Parabolic Equation Method to Long-Range Propagation of Wind Turbine Noise, AIAA 2005-2834, 11th AIAA/CEAS Aeroacoustics Conference (26th AIAA Aeroacoustics Conference), Monterey, CA, May 23-25, 2005.

2.37 Chen, H.-N., Brentner, K. S. and Shirey, J. S.: An Investigation of Transient Rotor Noise in Maneuvering Flight, AIAA 2005-2903, 11th AIAA/CEAS Aeroacoustics Conference (26th AIAA Aeroacoustics Conference), Monterey, CA, May 23-25, 2005.

2.38 Chen, H.-N., Brentner, K. S., Ananthan, S., and Leishman, J. G.: A Computational Study of Helicopter Rotor Wakes and Noise Generated During Transient Maneuvers, American Helicopter Society 60th Annual Forum Proceedings, Grapevine, TX, June 1-3, 2005.

2.39 Duque, E.P.N., Sankar, L.N., Menon, S., Bauchau, O., Ruffin, S., Smith, M., Ahuja, K., Brentner, K.S., Long, L.N., Morris, P.J., Gandhi, F., 2006, "Revolutionary Physics-Based Design Tools for Quiet Helicopters," *44th AIAA Aerospace Sciences Meeting and Exhibit* Reno, NV, January 9-12, 2006.

2.40 Lee, S., Brentner, K.S., Hennes, C.C., Flynt, B.T., Theron,J.N., Duque, E.P.N., 2006, "Investigation of the Accuracy Requirements for Permeable Surfaces Used in High-Speed Implusive Noise Prediction," *American Helicopter Society 62nd Annual Forum* Phoenix, AZ, May 9-11, 2006.

2.41 Chen, H.N, Brentner, K.S., Shirey, J.S., Horn, J. F., Anathan, S., and Leishman, J.G., 2006, "A Study of the Aerodynamics and Acoustics of Super-BVI," *American Helicopter Society 62nd Annual Forum* Phoenix, AZ, May 9-11, 2006.

2.42 Lopes, L.V., Brentner, K.S., Morris, P.J., 2006, "A New Prediction Method For Landing Gear Noise," *12th AIAA/CEAS Aeroacoustics Conference* Cambridge, Mass., May 8-10, 2006.

2.43 Cheng, R., Morris, P.J., Brentner, K.S., 2006, "A 3D Parabolic Equation Method for Wind Turbine Noise Propagation in Moving Inhomogeneous Atmosphere.," *12th AIAA/CEAS Aeroacoustics Conference* Cambridge, Mass., May 8-10, 2006.

2.44 Chen, H.N., Shirey, J.S., and Brentner, K.S., 2006, "Rotor Generated Noise in Maneuvering Flight," *25th Army Science Conference*, Orlando, FL, November 27-30, 2006.

2.45 Shirey, J.S., Brentner, K.S., and Chen, H.N., 2007, "A Validation Study of the PSU-WOPWOP Rotor Noise Prediction Code," *45th AIAA Aerospace Sciences Meeting and Exhibit* AIAA-2007-1240, Reno, NV, January 8-11, 2007.)

2.46 Chen, H.N., and Brentner, K.S., 2007, "Overview of Rotor Noise in Maneuvering Flight," *American Helicopter Society 63rd Annual Forum*, Virginia Beach, VA, May 1-3, 2007.

2.47 Farassat, F., Brentner, K.S., and Dunn, M. H., 2007, “Working With the Wave Equation in Aeroacoustics – The Pleasures of Generalized Functions,” AIAA-2007-3562, 13th AIAA/CEAS Aeroacoustics Conference (28th AIAA Aeroacoustics Conference), Rome, Italy, May 21-23, 2007.

2.48 Cheng, R., Morris, P., and Brentner, K., “A 3D Parabolic Equation Method for Sound Propagation in Moving Inhomogeneous Media,” AIAA-2007-3564, 13th AIAA/CEAS Aeroacoustics Conference (28th AIAA Aeroacoustics Conference), Rome, Italy, May 21-23, 2007.

2.49 Lee, S., Brentner, K., and Farassat, F., 2007 “Analytic Formulation and Numerical Implementation of an Acoustic Pressure Gradient Prediction ,” AIAA-2007-3710 13th AIAA/CEAS Aeroacoustics Conference (28th AIAA Aeroacoustics Conference), Rome, Italy, May 21-23, 2007.

2.50 Farassat, F., Brentner, K.S., and Dunn, M. H., 2007, "Working With the Wave Equation in Aeroacoustics - The Pleasures of Generalized Functions," 13th AIAA/CEAS Aeroacoustics Conference (28th AIAA Aeroacoustics Conference), Rome, Italy, May 21-23, 2007. AIAA-2007-3562

2.51 Chen, H.N, and Brentner, K.S., "Overview of Rotor Noise in Maneuvering Flight,” American Helicopter Society 63rd Annual Forum, Virginia Beach, VA, May 1-3, 2007.

2.52 Christopher C. Hennes and Kenneth S. Brentner, "A General Approach to Vorticity Confinement Development for High-Order Flow Solvers," American Helicopter Society 64rd Annual Forum, Montreal, Canada, April 29 - May 1, 2008.

2.53 Lee, S., Erwin, J. P., and Brentner, K. S., "Acoustic Scattering of Rotorcraft Noise," American Helicopter Society 64rd Annual Forum, Montreal, Canada, April 29 - May 1, 2008..

2.54 Kenneth S. Brentner, Philip J. Morris, and Leonard V. Lopes*,"A Method for Predicting the Noise of a Tip-Jet Driven Rotor," American Helicopter Society 64rd Annual Forum, Montreal, Canada, April 29 - May 1, 2008.

2.55 Lopes, L. V., Brentner, K. S., and Morris, P. J., "Airframe Noise Prediction with Installed Landing Gear for a Complete Aircraft," AIAA-2009-3155, 15th AIAA/CEAS Aeroacoustics Conference (30th AIAA Aeroacoustics Conference), Miami, Florida, May 11-13, 2009.

2.56 Lee, S., Brentner, K. S., and Morris, P. J., "Prediction of Acoustic Scattering in the Time Domain Using a Moving Equivalent Source Method," AIAA-2009-3177, 15th AIAA/CEAS Aeroacoustics Conference (30th AIAA Aeroacoustics Conference), Miami, Florida, May 11-13, 2009.

2.57 Erwin, J. P., Morris, P. J., and Brentner, K. S., "Trailing-edge noise prediction using the nonlinear disturbance equations," 28th ASME Wind Energy Symposium held as part of the 47th AIAA Aerospace Sciences Meeting, AIAA-2009-0272, January 5-8, 2009.

2.58 Lee, S., Brentner, K. S., and Morris, P. J., 2009 "Time-domain Approach for Acoustic Scattering of Rotorcraft Noise," Annual Forum Proceedings - AHS International, Vol. 1, Pages 579-591.

2.59 Lee, S., Morris, P. J., and Brentner, K. S., "Nonlinear Acoustic Propagation with Applications to Aircraft Noise and Helicopter Noise," AIAA-2010-1384, 48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition, Orlando, FL, January 4-7, 2010.

2.60 Poulain, K., Sparrow, V, Brentner, K., and Southerland, L., "Application of atmospheric absorption models for aircraft enroute noise," Proc. of NoiseCon 2010, Baltimore, Maryland, April 19-21, 2010. (Institute of Noise Control Engineering of the USA, Washington, DC.)

2.61 Duque, E. P. N., Stone, C. P., Brentner, K. S., and Legensky, S., M., "RCAAPS - Rotorcraft Computational AeroAcoustics Post-Processing System," 48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition, Orlando, FL, January 4-7, 2010.

2.62 Lee, S., Brentner, K. S., and Morris, P. J., "Long-Range and Nonlinear Propagation of Helicopter High-Speed Impulsive Noise," AHS International 66th Annual Forum Proceedings, Phoenix, AZ, May 11-13, 2010, 18 pages

2.63 Lee., S., Brentner, K. S., and Morris, P. J., "Assessment of Time-Domain Equivalent Source Method for Acoustic Scattering," AIAA-2010-3821, 16th AIAA/CEAS Aeroacoustics Conference, Stockholm, Sweden, June 7-9, 2010. AIAA-2010-3821, 16th AIAA/CEAS Aeroacoustics Conference, Stockholm, Sweden, June 7-9, 2010.

2.64 Bain, J., Potsdam, M., Sankar, L., and Brentner, K. S., "Aeromechanics and Aeroacoustic Predictions of the Boeing SMART Rotor Using Coupled CFD/CSD Analysis," AHS International 66th Annual Forum Proceedings, Phoenix, AZ, May 11-13, 2010, 18 pages.

3. Other Publications

3.1 Brentner, K.; Hardin, J.; Lamkin, S.; Meadows, K.; Myers, M.; Pope, S.; Watson, W.: White Paper on Computational Aeroacoustics, White Paper, July 1990.

3.2 Brentner, Kenneth S.: The Sound of Moving Bodies. Ph.D. dissertation, University of Cambridge, Cambridge, UK, December 1990.

3.3 Brooks, Thomas F., with contributions from Brentner, Kenneth S.; Burley, Casey L.; Conner, David A.; Golub, Robert A.; Marcolini, Michael A.; Martin, Ruth M.; Mueller, Arnold W.; Berry, John, D.; Gorton, Susan A.; and Jones, Henry E.: Tiltrotor Aeroacoustic Prediction Development at Langley (Element of the Short Haul–Civil Tiltrotor Program), White Paper, March 4, 1994.

3.4 , Kenneth S.: Aerodynamic Impact on Noise and Emissions. (Chapter 6) in Potential Impacts of Advanced Aerodynamic Technology on Air Transportation System Productivity, edited by Dennis M. Bushnell, NASA TM 109154, September 1994.

3.5 Anders, Scott G., Asbury, Scott C., Brentner, Kenneth S., Bushnell, Dennis M., Glass, Christopher E., Hodges, William T., Morris, Shelby J., Jr., and Scott, Michael A., “The Personal Aircraft – Status and Issues,” NASA TM 109174.

3.6 Brentner, K. S., “Noise Prediction for Two Silent Rotor Configurations with Comparison with a 427 Rotor,” final report to Bell Helicopter Textron, Inc., February 7, 2001.

3.7 Brentner, K. S., "Noise Prediction for Four SILENT Rotor Blade-Spacing Candidate Designs," final report to Bell Helicopter Textron, Inc. May 30, 2001.

3.8 Morris, P.J., Long, L.N., and Brentner, K.S.: Computational Aeroacoustic Analysis of Wind Turbines. Interim Report to the National Renewable Energy Laboratory, Subcontract No. ZAM-3-32246-01, February 2004.

3.9 Brentner, K. S.: Axial Fan Noise Prediction Using PSU-WOPWOP, Final report to Trane, Inc., December 2004.

3.10 Morris, P. J. and Brentner, K. S.: The Prediction of Jet Noise for a Canard Rotor Wing Vehicle, Final report to the Boeing Company, Mesa, AZ, December 2004.

3.11 Brentner, K. S.: Analysis of Noise from Airfoils with Pulse Jet Fluid Control, Final report for P.O. # 888407 to the Boeing Company, Mesa, AZ, November 26, 2005.

4. Other Presentations

4.1 Brentner, Kenneth S.: Direct Numerical Calculation of Acoustics: Solution Evaluation Through Energy Analysis, **invited seminar** presented at Penn State University, December 3, 1992.

4.2 Brentner, Kenneth S.: Helicopter Noise Prediction: Current Theory and Practice, **invited seminar** presented at the First NASA LaRC - Hampton University Partnership in Fluid Mechanics and Acoustics Workshop, May 15-16, 1997.

4.3 Brentner, Kenneth S.: Helicopter Rotor Noise Prediction: Background, Current Status, and Future Direction, **invited seminar** presented at Old Dominion University, September 12, 1997.

4.4 Brentner, Kenneth S.: A Superior Kirchhoff Method for Aeroacoustic Noise Prediction: The Ffowcs Williams–Hawkings Equation, **invited paper** presented at the 134th meeting of the Acoustical Society of America, December 1–5, 1997, San Diego, CA. (Abstract in *Journal of the Acoustical Society of America,* Vol. 102, No. 5, Pt. 2, November 1997.)

4.5 Brentner, Kenneth S.: Helicopter Rotor Noise Prediction: Background, Current Status, and Future Direction, **invited seminar** presented at University of Tennessee Space Institute, December 10, 1997.

4.6 Brentner, Kenneth S.: Helicopter Rotor Noise Prediction: Background, Current Status, and Future Direction, **invited seminar** presented at Purdue University, January 22, 1998.

4.7 Brentner, Kenneth S.: High-Speed Rotor Noise Prediction, presented at July Langley Technical Forum, July 15, 1998.

4.8 Brentner, Kenneth S.: Status of High-Speed Impulsive Noise Prediction in TRAC, presented at TRAC Workshop, March 2-3, 1999.

4.9 Brentner, Kenneth S.: Recent Developments in Helicopter Rotor Noise Prediction at NASA, **invited paper** presented at the Joint 137th Meeting of the Acoustical Society of America,

the 2nd convention of the European Acoustical Association: Forum Acusticum integrating the 25th German Acoustics DAGA Conference, Berlin, Germany, March 15-19, 1999.

4.10 Singer, Bart A.; Brentner, Kenneth S.; Lockard, David P.; and Lilley, Geoffrey M.: Simulation of Acoustic Scattering from a Trailing Edge, **invited paper** presented at the Joint 137th Meeting of the Acoustical Society of America, the 2nd convention of the European Acoustical Association: Forum Acusticum integrating the 25th German Acoustics DAGA Conference, Berlin, Germany, March 15-19, 1999.

4.11 Brentner, Kenneth S.: Challenges of Large Acoustic and Unsteady Fluid Dynamics Computations, **invited seminar** presented at The Pennsylvania State University for the High Performance Computing Invited Lecture Series, State College, PA, April 26, 1999.

4.12 Brentner, Kenneth S.: Rotorcraft Noise Prediction--A Successful Application of Computational Aeroacoustics, **invited presentation** at the 3rd Computational Aeroacoustics Workshop on Benchmark Problems, Cleveland, OH, November 8-10, 1999

4.13 Brentner, Kenneth S.: Rotor Noise Prediction for Maneuvering Rotorcraft, **invited seminar** at the Dept. of Aerospace Engineering, University of Maryland, May 8, 2002.

4.14 Brentner, Kenneth S.: Rotor Noise Prediction for Maneuvering Rotorcraft, **invited presentation** at United Technologies Research Center, May 9, 2002.

4.15 Brentner, Kenneth S.: Rotorcraft Noise Prediction—Theory and Current Practice, **invited seminar** at Dept. of Aerospace Engineering, Kasetsart University, Bangkok, Thailand, August 13, 2002.

4.16 Brentner, Kenneth S.: Aerospace Engineering at Penn State University, **invited seminar** at the Royal Thai Air Force Academy, Bangkok, Thailand, August 14, 2002.

4.17 Brentner, Kenneth S.: Rotorcraft Noise Prediction—Theory and Current Practice, **invited seminar** at the Royal Thai Air Force Academy, Bangkok, Thailand, August 14, 2002.

4.18 Brentner, Kenneth S.: Helicopter Aerodynamics, **invited seminar** at the College of Engineering, Rangsit University, Bangkok, Thailand, August 16, 2002.

4.19 Brentner, Kenneth S.: An Introduction to Helicopters and Rotor Noise, **invited seminar** at the College of Engineering, South-East Asia University, Bangkok, Thailand, August 17, 2002.

4.20 Brentner, Kenneth S.: Rotor Noise Prediction – Theory and Current Practice, **invited seminar**, Trane Technology Center, LaCrosse, WI, July 31, 2003.

4.21 Brentner, Kenneth S.: A Component Based Approach to Landing Gear Noise, **invited presentation**, Airframe Noise Workshop, NASA Langley Research Center, Hampton, VA, February 10–11, 2004.

4.22 Brentner, Kenneth S.: Helicopter Noise Prediction – Steady and Maneuvering Flight, **invited seminar,** Center for Acoustics and Vibration, Penn State University, April 30, 2004.

4.23 Brentner, Kenneth S.: Helicopter Noise Prediction – Steady and Maneuvering Flight, **invited seminar,** Dept of Engineering, University of Cambridge, UK, May 14, 2004.

4.24 Brentner, Kenneth S.: Recent Aeroacoustics Research at Penn State An, **invited seminar**, Bell Helicopter Textron, Inc., Hurst, TX, June 14, 2004.

4.25 Brentner, Kenneth S.: Rotor Noise Prediction for Steady and Maneuvering Flight, **invited seminar**, Bell Helicopter Textron, Inc., Hurst, TX, June 14, 2004.

4.26 Brentner, Kenneth S.: An Introduction to PSU-WOPWOP, **invited seminar**, Bell Helicopter Textron, Inc., Hurst, TX, June 15, 2004.

4.27 Brentner, Kenneth S.: Update on Computational Aeroacoustics Research at PSU, **invited seminar**, Trane Technology Center, LaCrosse, WI, July 23, 2004.

4.28 Brentner, Kenneth S.: Rotor Noise Prediction for Steady and Maneuvering Flight, **invited seminar**, Trane Technology Center, LaCrosse, WI, July 23, 2004.

4.29 Brentner, Kenneth S.: Computational Aeroacoustics Analysis of Wind Turbines – Phase 2 Annual Report, presenter, National Renewable Energy Laboratory, Golden, CO, May 19, 2005.

4.30 Brentner, Kenneth S.: Helicopter Rotor Noise Prediction – Steady and Maneuvering Flight, **invited speaker**, U.S. Army – AATD, Newport News, VA, June 15, 2005.

4.31 Brentner, Kenneth S.: Status Report on DARPA Helicopter Quieting Program, National Rotorcraft Technology Center, presenter, College Park, MD, August 26, 2005.

4.32 Brentner, Kenneth S.: Complex Landing Gear Noise Prediction Using a Simple Toolkit, presenter, NASA Langley Research Center, Hampton, VA, September 13, 2005.

4.33 Brentner, Kenneth S.: Computational Aeroacoustics Analysis of Wind Turbines, presenter, NASA Langley Research Center/National Renewable Energy Laboratory, Hampton, VA, September 14, 2005.

4.34 Brentner, Kenneth S.: Recent Experience - College of Engineering Promotion and Tenure Workshop, **invited speaker**, College of Engineering, The Pennsylvania State University, University Park, PA, September 20, 2005.

4.35 Brentner, Kenneth S.: Helicopter Rotor Noise Prediction – Background and State-of-the-Art, **invited speaker,** Georgia Institute of Technology, Atlanta, GA, September 2007.

4.36 Brentner, Kenneth S.: Computational Research Needs in Alternative and Renewable Energy, **invited participant**, Department of Energy, Rockville, MD, September 2007.

4.37 Brentner, Kenneth S.: Helicopter Rotor Noise Prediction – Background and State-of-the-Art, **invited speaker,** University of Michigan, Ann Arbor, MI, October 2007.

4.38 Brentner, Kenneth S.: Workshop on Research Needs for Wind Resource Characterization, **invited participant**, Department of Energy, Golden, CO, January 2008.

4.39 Brentner, Kenneth S.: Noise Prediction using the Ffowcs Williams – Hawkings Equation, **invited speaker**, Exa Corportation, Boston, MA, July 2008.

4.40 Brentner, Kenneth S.: Rotor and Propeller Source Noise Prediction, **invited speaker and panel participant**, DARPA/NASA, NASA Langley Research Center, March 2010.