

JORGE C. LUCERO

Department of Mathematics, University of Brasilia  
Brasilia DF 70910-900, Brazil

Phone: +55-61-3107 6439, Fax: +55-61-3273 2737

E-mail: lucero@unb.br

Web page: <http://www.mat.unb.br/lucero/>

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### Scientific interests

Biomechanics of voice and speech production, computer facial animation, speech synthesis and processing, mathematical modeling and simulation of physiological system

### Education

- 1993 Ph.D. in Electronic Engineering, Shizuoka University (Japan).
- 1990 Master of Engineering, Shizuoka University (Japan).
- 1985 Electrical Engineering, National University of Cordoba (Argentina).

### Professional history

- 2000 – Present Associate Professor. Dept. Mathematics, University of Brasilia.
- 1997 – 2000 Visiting Professor. Dept. Mathematics, University of Brasilia.
- 1996 – 1997 Postdoctoral Fellow, with Dr. Kevin G. Munhall, Dept. Psychology, Queen's University (Canada), and with Dr. Demitri Terzopoulos, Dept. Computer Science, University of Toronto.
- 1995 – 1996 Research Associate at Dept. Computer Science, University of Brasilia.
- 1994 – 1995 Substitute Professor. Dept. Mathematics, University of Brasilia.
- 1993 – 1994 Research Associate at Research Group on Biomedical Engineering, Federal University of Santa Catarina (Brazil).
- 1985 – 1986 Electronic Engineer at Automation Lab, Renault Argentina SA. In charge of training technical staff on industrial electronics.

### Awards

- 1998 – Present Research Fellowship of CNPq (Brazil) in Applied Mathematics.
- 1993 – 1994 and 1995- 1996 Research Fellowship of CNPq for recent Ph.D.'s in Biomedical Engineering
- 1987 – 1993 Graduate Scholarship of the Japanese Ministry of Education (*Monbusho*) for foreign students.
- 1984 Diploma for Merits in the Career of Engineering, given by the Center of Engineers of Córdoba (Argentina).

## Research grants in Brazil

- 2008 – 2012 “Stochastic modeling and signal processing”. CAPES Academic Cooperation Program between Univ. of Brasilia, Federal Univ. of the Amazon, and Federal Univ. of Para. Role: national coordinator (PI).
- 2007 – 2011 “Mathematical modeling and analysis of voice production”, CNPq grant (PI).
- 2005 – 2007 “Algorithmic modeling, semantics and applications”, CNPq grant (co-PI).
- 2001 – 2003 “Facial animation during speech”, CNPq grant (PI).

## International cooperation

- 2007 – 2009 “Modeling voice production”. Cooperation CAPES (Brazil), SECyT (Argentina), INRIA (France), and CNRS (France); with Denisse Sciamarella (international coordinator, LIMSI/CNRS), Xavier Pelorson (Gipsa-Lab/CNRS), Guillermo Artana (Univ. Buenos Aires), and others. Role: Coordinator for Brasil (PI).
- 2003 – 2007 Consultant to Dr. Kevin G. Munhall at Queen’s University (Canada), in grant of the National Institute of Deafness and Other Communications Disorders: “Visual contributions to speech perception”.
- 2001 – 2005 Consultant to Dr. Laura L. Koenig at Haskins Laboratories (USA), in grant of the National Institutes of Health National Institute of Deafness and Other Communications Disorders: “Dynamic patterns of speech aerodynamics in children”.
- 2002 – 2003 Consultant to Dr. Anders Löfqvist at Haskins Laboratories (USA), in grant of the National Institute of Deafness and Other Communications Disorders: “Sources of sound in speech”.

## Papers in journals and books

h-index: 9 (Web of Science)

1. P. Howell, A. Anderson and J. C. Lucero. “Motor timing and fluency,” in B. Maasen, P. H. H. M. van Lieshout (eds.), *Speech Motor Control: New Developments in Basic and Applied Research*, Oxford University Press (in press).
2. J. C. Lucero, A. Van Hirtum, N. Ruty, J. Cisonni and X. Pelorson. “Validation of theoretical models of phonation threshold pressure with data from a vocal fold mechanical replica,” *Journal of the Acoustical Society of America* 125, 632-635 (2009).
3. L. L. Koenig, J. C. Lucero and E. Perlman. “Speech production variability in fricative of children and adults: Results of functional data analysis,” *Journal of the Acoustical Society of America* 124, 3158-3170 (2008).
4. L. L. Koenig, J. C. Lucero and W. E. Mencl. “Laryngeal and aerodynamic adjustments for voicing vs. devoicing of /h/: A within-speaker study,” *Journal of Voice* 22, 709-720 (2008).
5. J. C. Lucero and K. G. Munhall. “Analysis of facial motion patterns during speech using a matrix factorization algorithm,” *Journal of the Acoustical Society of America* 124, 2283-2290 (2008).
6. J. C. Lucero. “Advanced-delay differential equation for aeroelastic oscillations in physiology,” *Biophysical Reviews and Letters* 3, 125-133 (2008).

7. E. Cataldo, R. Sampaio, J. C. Lucero and C. Soize. "Modeling random uncertainties in voice production using a parametric approach," *Mechanics Research Communications* 35, 454-459 (2008).
8. L. L. Koenig and J. C. Lucero. "Stop consonant voicing and intraoral pressure contours in women and children," *Journal of the Acoustical Society of America* 123, 1077-1088 (2008).
9. J. C. Lucero and L. L. Koenig. "On the relation between the phonation threshold lung pressure and the oscillation frequency of the vocal folds," *Journal of the Acoustical Society of America* 121, 3280-3283 (2007).
10. J. C. Lucero and C. A. Gajo. "Oscillation region of a piecewise-smooth model of the vocal folds," *Communications in Mathematical Sciences* 4, 453-469 (2006).
11. E. Cataldo, F. R. Leta, J. C. Lucero and L. Nicolato. "Synthesis of voiced sounds using low-dimensional models of the vocal cords and time varying subglottal pressure," *Mechanics Research Communications* 33, 250-260 (2006).
12. J. C. Lucero. "Bifurcations and limit cycles in a model for a vocal fold oscillator," *Communications in Mathematical Sciences* 3, 517-529 (2005).
13. J. C. Lucero and L. L. Koenig. "Phonation thresholds as a function of laryngeal size in a two-mass model of the vocal folds," *Journal of the Acoustical Society of America*, 118, 2798-2801 (2005).
14. L. L. Koenig, W. E. Mencl and J. C. Lucero. "Multidimensional analysis of voicing offsets and onsets in female speakers", *Journal of the Acoustical Society of America*, 118, 2535-2550 (2005).
15. J. C. Lucero, S. T. R. Maciel, D. A. Johns and K. G. Munhall. "Empirical modeling of human face kinematics during speech using motion clustering," *Journal of the Acoustical Society of America* 118, 405-409 (2005).
16. J. C. Lucero. "Comparison of measures of variability of speech movement trajectories using synthetic records," *Journal of Speech, Language, and Hearing Research* 48, 336-344 (2005).
17. J. C. Lucero and L. L. Koenig. "Simulations of temporal patterns of oral airflow in men and women using a two-mass model of the vocal folds under dynamic control," *Journal of the Acoustical Society of America* 117, 1362-1372 (2005).
18. J. C. Lucero. "Oscillation hysteresis in a two-mass model of the vocal folds," *Journal of Sound and Vibration* 282, 1247-1254 (2005).
19. J. C. Lucero and A. Löfqvist. "Measures of articulatory variability in VCV sequences," *Acoustics Research Letters Online* 6, 80-84 (2005).
20. J. C. Lucero. "Dynamics of a scaled two-mass model of the vocal folds for men and women," *Acoustical Science and Technology* 25, 478-479 (2004).
21. J. C. Lucero. "Identifying a differential equation for lip motion signals," *Medical Physics and Engineering* 24, 521-528 (2002).
22. J. C. Lucero and L. L. Koenig. "Time normalization of voice signals using functional data analysis," *Journal of the Acoustical Society of America* 108, 1408-1420 (2000).
23. J. C. Lucero and K. G. Munhall. "A model of facial biomechanics for speech production," *Journal of the Acoustical Society of America* 106, 2834-2848 (1999).
24. J. C. Lucero. "Computation of the Harmonics-to-Noise Ratio of a voice signal using a Functional Data Analysis Algorithm," *Journal of Sound and Vibration* 223, 512-520 (1999).
25. J. C. Lucero. "A theoretical study of the hysteresis phenomenon at vocal fold oscillation onset-offset," *Journal of the Acoustical Society of America* 105, 423-431 (1999).
26. J. C. Lucero. "A subcritical Hopf bifurcation at phonation onset," *Journal of Sound and Vibration* 218, 344-349 (1998).

27. J. C. Lucero. "Optimal glottal configuration for ease of phonation," *Journal of Voice* 12, 151-158 (1998).
28. H. N. Moreira and J. C. Lucero. "Some stability results for an SIRS epidemic model with nonlinear incidence," *Cybernetica* 40, 217-228 (1997).
29. J. C. Lucero, K. G. Munhall, V. L. Gracco and J. O. Ramsay. "On the registration of time and the patterning of speech movement signals," *Journal of Speech, Language, and Hearing Research* 40, 1111-1117 (1997).
30. J. C. Lucero. "Chest- and falsetto-like oscillations in a two-mass model of the vocal folds," *Journal of the Acoustical Society of America* 100, 3355-3359 (1996).
31. J. C. Lucero. "Relation between the phonation threshold pressure and the prephonatory glottal width," *Journal of the Acoustical Society of America* 100, 2551-2554 (1996).
32. J. C. Lucero. "Bifurcations in a two-mass model of the vocal folds," *Journal of the Acoustical Society of Japan* 17, 211-214 (1996).
33. J. C. Lucero. "The minimum lung pressure to sustain vocal fold oscillation," *Journal of the Acoustical Society of America* 98, 779-784 (1995).
34. J. C. Lucero. "Dynamics of the two-mass model of the vocal folds: Equilibria, bifurcations, and oscillation region," *Journal of the Acoustical Society of America* 94, 3104-3111 (1993).
35. J. C. Lucero and T. Gotoh. "On the threshold pressure and the minimum sustaining pressure in the vocal fold oscillation," *Journal of the Acoustical Society of Japan* 14, 213-215 (1993).
36. J. C. Lucero. "Characteristic recovery time of an erythrocyte from an extensional deformation," *ASME Journal of Biomechanical Engineering* 115, 206-207 (1993).
37. Y. Tatara, S. Shima, & J. C. Lucero. "On compression of rubber elastic sphere over a large range of displacements - Part 2: Comparison of theory and experiment," *ASME Journal of Engineering Materials and Technology* 113, 292-295 (1991).

### **Selected conferences**

1. J. C. Lucero and K. G. Munhall. "Identification of independent kinematic regions of the face during speech production," 8th International Seminar on Speech Production (Strasbourg, 2008). Proceedings: 385-388.
2. J. C. Lucero and L. L. Koenig. "Computer simulations of intraoral pressure patterns during voiced stop consonant production", *Acoustics'08* (Paris, 2008). Abstract: *Journal of the Acoustical Society of America* 123, 3074-3074 (2008).
3. J. C. Lucero, A. Van Hirtum, N. Ruty, J. Cisonni and X. Pelorson. "Theoretical and experimental results of phonation threshold pressure vs. oscillation frequency of the vocal folds," *Acoustics'08* (Paris, 2008). Abstract: *Journal of the Acoustical Society of America* 123, 3578-3578 (2008).
4. J. C. Lucero, A. R. Baigorri and K. G. Munhall. "Data-driven facial animation of speech using a QR factorization algorithm," 7th International Seminar on Speech Production (Ubatuba, 2006). Proceedings: 135-142.
5. A. Van Hirtum, J. Cisonni, N. Ruty, J. C. Lucero and X. Pelorson. "Theoretical and experimental validation of a non-linear vocal fold model," 7th International Seminar on Speech Production (Ubatuba, 2006). Proceedings: 557-564.
6. J. C. Lucero and L. L. Koenig. "Measures of intraoral pulse shape during stop consonants," 4th Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan, (Honolulu, 2006). Abstract: *Journal of the Acoustical Society of America* 120, 3372-3372 (2006).

7. K. G. Munhall, A. Wilson, J. Buchan, J. C. Lucero and M. Pare. "Spatial and temporal patterns in visual speech," 5th ATR Symposium on Cross-modal Processing of Faces and Voices (Kyoto, 2005).
8. J. C. Lucero. "Dynamics of a two-mass model of the vocal folds for men, women, and children", 4th International Conference on Voice Physiology and Biomechanics (Marseille, 2004). Proceedings: 191-195.
9. L. L. Koenig and J. C. Lucero. "Measurements of voicing offset and onset in men and women: further data", 4th International Conference on Voice Physiology and Biomechanics (Marseille, 2004). Proceedings: 93 (abstract).
10. J. C. Lucero and A. Löfqvist. "Functional data analysis of articulatory variability in VCV sequences", 6th International Seminar on Speech Production (Sydney, 2003). Proceedings: 156-160.
11. J. C. Lucero and L. L. Koenig. "Simulations of VhV sequences in children", 15th International Conference on Phonetic Science (Barcelona, 2003). Proceedings: 2605-2608.
12. L. L. Koenig, J. C. Lucero and A. Lofqvist. "Studying articulatory variability using functional data analysis", 15th International Conference on Phonetic Science (Barcelona, 2003). Proceedings: 269-272.
13. L. L. Koenig and J. C. Lucero. "The use of functional data analysis to study variability in children's speech: Further data," 143rd Meeting of the Acoustical Society of America (Pittsburgh, 2002). Abstract: Journal of the Acoustical Society of America 111, 2478 (2002).
14. J. C. Lucero and A. Löfqvist. "Studying articulatory variability using functional data analysis", First Pan-American/Iberian Meeting on Acoustics (Cancun, 2002). Abstract: Journal of the Acoustical Society of America 112, 2417 (2002).
15. L. L. Koenig and J. C. Lucero. "Measures of variability in child and adult speech: Test-retest results", First Pan-American/Iberian Meeting on Acoustics (Cancun, 2002). Abstract: Journal of the Acoustical Society of America 112, 2416 (2002).
16. G. Rothman, L. L. Koenig and J. C. Lucero. "Intraoral pressure trajectories during voiced and voiceless stops in women and children", First Pan-American/Iberian Meeting on Acoustics (Cancun, 2002). Abstract: Journal of the Acoustical Society of America 112, 2416 (2002).
17. J. C. Lucero and L. L. Koenig, "Simulations of voice onset-offset patterns using a two-mass model of the vocals fold", 3rd Biennial International Conference on Voice Physiology and Biomechanics (Denver, 2002).
18. L. L. Koenig and J. C. Lucero, "Measurements of voicing hysteresis in men and women", 3rd Biennial International Conference on Voice Physiology and Biomechanics (Denver, 2002).
19. L. L. Koenig and J. C. Lucero, "Oral-laryngeal control patterns for fricatives in 5-year olds and adults", 7th International Conference on Spoken Language Processing (Denver, 2002). Proceedings: 49-52
20. J. C. Lucero. "Principal differential analysis of lip motion signals", 2nd International Workshop on Models and Analysis of Vocal Emissions for Biomedical Applications (Florence, 2001). Proceedings: in CD-ROM.
21. J. C. Lucero & L. L. Koenig. "Simulations of voice onset-offset hysteresis in /aha/ utterances", 140th Meeting of the Acoustical Society of America and Noise-Con 2000 (Newport Beach, USA, December 2000). Abstract: Journal of the Acoustical Society of America 108, 2508 (2000)
22. L. L. Koenig & J. C. Lucero . "The use of functional data analysis to study variability in children's speech", 140th Meeting of the Acoustical Society of America and Noise-Con 2000

- (Newport Beach, USA, December 2000). Abstract: *Journal of the Acoustical Society of America* 108, 2509 (2000)
23. K. G. Munhall, C. Kroos, T. Kuratate, J. C. Lucero, M. Piterman, E. V. Bateson and H. Yehia. "Studies of audiovisual speech perception using production-based animation," 6th International Conference on Spoken Language Processing (Beijing, 2000). Proceedings: Vol. III, 7-10.
  24. J. C. Lucero. "Measures of variability of speech movement signals using functional data analysis", 5th Seminar on Speech Production: Models and Data & CREST Workshop on Models of Speech Production: Motor Planning and Articulatory Modeling (Kloster Seeon, 2000). Proceedings: 135-138
  25. J. C. Lucero. "Bifurcations at voice onset-offset", 137th Meeting of the Acoustical Society of America and the 2nd Convention of the European Acoustics Association: Forum Acusticum (Berlin, 1999). Abstract: *Journal of the Acoustical Society of America* 105, 1161 (1999)
  26. J. C. Lucero & L. L. Koenig, "Time normalization of voice signals using Functional Data Analysis", 2nd International Conference in Voice Physiology and Biomechanics (Berlin, Germany, March 1999).
  27. K.G. Munhall, J. A. Jones, & J. C. Lucero, "Issues in Audiovisual Speech Behaviour", 5th ATR Symposium on Face and Object Recognition (Kyoto, Japan, April 1998).
  28. K. G. Munhall, V. L. Gracco, J. A. Jones, & J. C. Lucero, "Variability in speech motor control", IX Biennial Conference on Motor Speech (Tucson, USA, January 1998).
  29. J. C. Lucero, K. G. Munhall, E. Vatikiotis-Bateson, V. L. Gracco, & D. Terzopoulos, "Muscle-based modeling of facial dynamics during speech production", 133th Meeting of the Acoustical Society of America (State College, USA, June 1997). Abstract: *Journal of the Acoustical Society of America* 101, 3175-3176 (1997).
  30. J. C. Lucero, "Dynamics of phonation onset/offset", 1st International Conference on Voice Physiology and Biomechanics (Evanston, USA, May 1997).
  31. K. G. Munhall & J. C. Lucero, "Static and dynamic information in audiovisual speech perception", 4th ATR Symposium on Face and Object Recognition (Kyoto, Japan, January 1997). Proceedings: 41-42.
  32. J. C. Lucero, "Optimal glottal width and convergence angle for ease of phonation", 3rd Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan (Honolulu, USA, December 1996). Abstract: *Journal of the Acoustical Society of America* 100, 233, (1996).
  33. J. C. Lucero, "Nonlinear dynamics of the vocal fold oscillation", ESCA Tutorial and Research Workshop on Speech Production Modeling & 4th Speech Production Seminar (Autrans, 1996). Proceedings: 181-185.
  34. J. C. Lucero, "The minimum lung pressure to sustain the vocal fold oscillation", 1994 World Congress on Medical Physics and Biomedical Engineering (Rio de Janeiro, Brazil, August 1994). Proceedings: 611 (abstract).
  35. J. C. Lucero & T. Gotoh. "Equilibrium positions in the plank model of the vocal cords and stability analysis", Autumn Meeting of the Acoustical Society of Japan (Kochi, Japan, October 1992). Proceedings: 343-344 (abstract).

### **Courses taught**

(Since 1994, average of two courses/semester)

**Graduate:** applied ordinary differential equations, mathematical modeling and identification of physical systems, theory of computing, artificial intelligence.

**Undergraduate:** computer programming for mathematics, ordinary differential equations, numerical methods, single variable calculus, multivariable calculus, theory of computing, artificial intelligence.

### **Student supervision**

Doctor of Mathematics: 3 students  
Master of Mathematics: 9 students  
Undergraduate research: 6 students

### **Editorial and grant reviewing**

**Grants:** The Wellcome Trust (UK), CNPq (Brazil)

**Journals:** Journal of the Acoustical Society of America; Speech Communication; Journal of Speech, Language, and Hearing Research; Medical Physics and Engineering; International Journal of Clinical Linguistics and Phonetics; Journal of Phonetics; Acta Acustica united with Acustica; Biomedical Signal Processing and Control; Journal of Sound and Vibration; Physical Review E, Journal of Biomechanics.

### **Memberships**

The Acoustical Society of America (full member), Brazilian Society of Applied and Computational Mathematics.

### **Languages**

Spanish (native), Portuguese (fluent), English (fluent), Japanese (good).