

## Douglas D. Cook

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### RESEARCH TOPICS

Experimental and computational biomechanics with emphasis on crop and plant biomechanics, and the influence of biological variation in modeling predictions, stochastic modeling to provide comprehensive insights on model behavior.

### EDUCATION

Doctor of Philosophy, Mechanical Engineering, Purdue University,	August 2009
Masters of Science, Mechanical Engineering, Purdue University,	December 2005
Bachelor of Science in Mechanical Engineering, Utah State University <i>Laude</i> , Minors in Mathematics and Mandarin Chinese	May 2003. <i>Cum</i>

### APPOINTMENTS

Assistant Professor, Mechanical Engineering, Brigham Young University	Jan 2018 - present
Assistant Professor, Engineering Division, New York University Abu Dhabi	2012 – Jan 2018
Research Assistant Professor, NYU Tandon School of Engineering	2012-2014
Research Associate of the National Center for Voice and Speech	2011 - present
Faculty Fellow, New York University Abu Dhabi	2009 - 2010

### RESEARCH FUNDING

1. DuPont Pioneer \$50,000 “Non-destructive evaluation of Maize Stalk Integrity”
2. BYU College of Engineering Mentored Research Grant \$25,000 “Implementing a Best-Practices Mentorship Training & Assessment Program in the Crop Biomechanics Laboratory”
3. BYU Graduate Mentoring \$15,000 “Assistantship Graduate and Undergraduate Engineering Students as Training Experts for Novel Agricultural Research”
4. “The influence of leaf/sheath interactions on maize growth and development” NYU Abu Dhabi Research Institute, \$48,150
5. (Mentor) USDA Postdoctoral Fellowship “Stalk Lodging: Development and Validation of Novel Devices to Measure Stalk Strength.” \$316,000
6. “Biomechanical analysis of stalk strength for improved phenotyping of late-season lodging” Monsanto Corporation. \$120,000
7. “Addressing Corn Stalk Breakage: An Engineering Approach to an Important Agronomical Problem” National Science Foundation. Personnel: Douglas Cook (PI), Brian Gardunia (Monsanto Corp). \$366,156
8. “Contemplating Voice: New Approaches to Voice-Based Research, Pedagogy and Art” The Humanities Initiative at New York University, Douglas Cook, Martin Daughtry. \$5,000
9. “Development of structural corn stalk models” NYU Abu Dhabi Research Institute. Douglas Cook, Brian Gardunia, Monsanto Corp. \$27,000
10. “Systematic Evaluation of Phonation Modeling Assumptions”, National Science Foundation Award Douglas Cook, Byron Erath, and Matias Zanartu. \$223,000

11. "A comprehensive survey of student life among mechanical engineering graduate students."  
Purdue University Strategic Initiatives Grant: \$43,233
12. National Science Foundation, East Asia and Pacific Summer Institute Fellowship, \$5500

### ACTIVE RESEARCH COLLABORATIONS

Monsanto Company – Maize Stalk Strength

Dr. Roger Elmore, Dept. of Agronomy, and Dr. Justin McMechan, Dept. of Agronomy and Horticulture, University of Nebraska, Lincoln – Corn Growth & Development.

Dr. William Rooney, Dept. of Soil and Crop Sciences, Texas A&M University – Assessing Sorghum Stalk Strength

Dr. Stephen Kresovich, Dept. of Genetics and Biochemistry, Clemson University – The Genetics of Sorghum Stalk Strength

### IN THE MEDIA

1. "Can You Hear the Corn Grow? Yes!" EurekaAlert.org, ScienceDaily.com, and Farms.com, from a press release by the Acoustical Society of America ([link](#))
2. "This is the Sound of Corn Growing" Ben Potter, AgWeb.com ([link](#))
3. "Biological Variability and Meta-Analysis in Biomechanical Engineering Research" feature article by Lillian Pierson in Wiley Statistics Views. ([link](#))

### ADVISED GRADUATE THESES/DISSERTATIONS

1. Ryan Larson, "Parameterization of the Maize Stalk Cross-section" Department of Mechanical Engineering, Brigham Young University. April 2020
2. Christopher J Stubbs, "Computational Modelling of Maize Stems", PhD Dissertation, Department of Mechanical Engineering, New York University, August 2019.

### SCHOLARLY ACTIVITY (top-tier journals or publishers underlined)

In review

1. Stubbs C, Larson L, and Cook DD, Maize Stem Buckling Failure is Dominated by Morphological Factors. (in review) Biosystems Engineering

Patents

1. Cook, D., Robertson, D., Julias, M., & Lee, S. Y. (2019). "Apparatus and method for assessing plant stem strength." U.S. Patent 10,337,951, Issued July 2, 2019.
2. Robertson, D, Cook, DD, Seegmiller W, Spence T, Seegmiller K, Stucker A, (in review) Method and Apparatus for Analyzing Stalk Strength." US Patent Application No. 17/109,989

## Peer-reviewed Publications

1. Erndwein, L., Cook, D. D., Robertson, D. J., & Sparks, E. E. (2020). Field-based mechanical phenotyping of cereal crops to assess lodging resistance. *Applications in Plant Sciences*, 8(8), e11382.
2. Stubbs, C. J., McMahan, C., Seegmiller, W., Cook, D. D., & Robertson, D. J. (2020). Integrated Puncture Score: Force-Displacement Weighted Rind Penetration Tests Improve Stalk Lodging Resistance Estimations in Maize. *Plant Methods*. 16(1).
3. Reneau, J. W., Khangura, R. S., Stager, A., Erndwein, L., Weldekidan, T., Cook, D. D., ... & Sparks, E. E. (2020). Maize brace roots provide stalk anchorage. *Plant direct*, 4(11), e00284
4. Christopher J Stubbs, Ryan Larson, Douglas D Cook, (2020) "Mapping Spatially Distributed Material Properties in Maize Stem Finite Element Models Using Computed Tomography", *Biosystems Engineering*. 200. 391-399.
5. Cook, D. D., Meehan, K., Asatiani, L., & Robertson, D. J. (2020). The effect of probe geometry on rind puncture resistance testing of maize stalks. *Plant Methods*, 16(1), 1-11.
6. Sekhon, R. S., Joyner, C. N., Ackerman, A. J., McMahan, C. S., Cook, D. D., & Robertson, D. J. (2020). Stalk bending strength is strongly associated with maize stalk lodging incidence across multiple environments. *Field Crops Research*, 249, 107737.
7. Cook, D. D., de la Chapelle, W., Lin, T. C., Lee, S. Y., Sun, W., & Robertson, D. J. (2019). DARLING: a device for assessing resistance to lodging in grain crops. *Plant methods*, 15(1), 102.
8. Nelson, N., Stubbs, C. J., Larson, R., & Cook, D. D. (2019). Measurement accuracy and uncertainty in plant biomechanics. *Journal of experimental botany*, 70(14), 3649-3658.
9. Stubbs, C. J., Cook, D. D., & Niklas, K. J. (2019). A general review of the biomechanics of root anchorage. *Journal of experimental botany*, 70(14), 3439-3451.
10. Stubbs, C. J., Sun, W., & Cook, D. D. (2019). Measuring the transverse Young's modulus of maize rind and pith tissues. *Journal of biomechanics*, 84, 113-120.
11. Stubbs, C. J., Baban, N. S., Robertson, D. J., Al Zube, L., & Cook, D. D. (2018). Bending stress in plant stems: models and assumptions. In *Plant Biomechanics* (pp. 49-77). Springer, Cham.
12. Al-Zube, L., Sun, W., Robertson, D., & Cook, D. (2018). The elastic modulus of maize stems. *Plant methods*, 14(1), 11.
13. Al-Zube, L. A., Robertson, D. J., Edwards, J. N., Sun, W., & Cook, D. D. (2017). Measuring the compressive modulus of elasticity of pith-filled plant stems. *Plant methods*, 13(1), 99.
14. Robertson, D.J., Julias, M., Lee, S.Y., and Cook, D.D., (2017) "Maize Stalk Lodging: Morphological Determinants of Stalk Strength." *Crop Science*. 57(2): 926-934
15. Cook, D.D. and Robertson, D.J. (2016) "The Generic Modeling Fallacy: Average Biomechanical Models Often Produce Non-Average Results!" *JBiomechanics*. (49)15:3609-3615.
16. Robertson, D.J., Zanartu, M., and Cook, D.D., (2016) "Comprehensive, Population-Based Sensitivity Analysis of a Two-Mass Vocal Fold Model." *PLOS One* 11(2).
17. Robertson, D.J., Lee, S.Y., Julias, M.J., Cook, D. (2016) "Maize Stalk Lodging: Flexural Stiffness Predicts Strength." *Crop Science*, 56(4): 1711-1718. doi:10.2135/cropsci2015.11.0665.
18. Robertson, D.J., Julias, M.J., Gardunia, B.W., Barten, T., and Cook, D. D. (2015) "Corn Stalk Lodging: a Forensic Engineering Approach Provides Insights into Failure Patterns and Mechanisms", *Crop Science*. 55(6): 2833-2841.
19. von Forell, G., Robertson, D., Lee, S.Y., and Cook, D.D., (2015) "Preventing lodging in bioenergy crops: a biomechanical analysis of structural stresses in maize stalks suggests a new approach" *Journal of Experimental Botany*. 66 (14): 4367-4371.
20. Robertson, D., Smith, S., Cook, D., (2015) "On measuring the bending strength of septate grass stems" *American Journal of Botany*, 102(1), pp. 5 - 11.
21. D. Robertson, D. Cook, (2015) "Hyperelasticity and the Failure of Averages", in J. Kruis, Y. Tsompanakis, B.H.V. Topping, (Editors), "Proceedings of the Fifteenth International Conference

- on Civil, Structural and Environmental Engineering Computing", Civil-Comp Press, Stirlingshire, UK. doi:10.4203/ccp.108.204
22. Robertson, D., Cook, D. (2014) "Unrealistic statistics: How average constitutive coefficients can produce non-physical results." *Journal of the Mechanical Behavior of Biomedical Materials*, Vol 40, pp. 234-239.
  23. Robertson, D.J., Smith, S.L. Gardunia, B.G., and Cook, D.D., (2014) "An Improved Method for Accurate Phenotyping of Corn Stalk Strength." *Crop Science*. Vol. 54, pp. 2038–2044.
  24. Cook, D.D., Julias, M. and Nauman, E., (2014) "Biological variability in biomechanical engineering research: significance and meta-analysis of current modeling practices." Perspective paper, *Journal of Biomechanics*, Vol.47, pp. 1241-1250.
  25. Cook, D.D., Julias, M., (2013) "The use of x-ray computed tomography for creating computational models of corn stalks and other plants: advantages, benefits, and common challenges." Eds. R. Sievanen, et al., Proceedings of the 7th International Conference on Functional-Structural Plant Models, Saariselka, Finland, 9-14 June.
  26. Julias M., Riede, T., and Cook D.D. (2013) "Visualizing Collagen Network Within Human and Rhesus Monkey Vocal Folds Using Polarized Light Microscopy." *Annals of Otolaryngology, Rhinology, and Laryngology* 122, pp. 135-144.
  27. Cook, D.D., Julias, M., and George, P., (2012) "2D/3D hybrid structural model of vocal folds." *Journal of Biomechanics*. 45(2), pp. 269-274.
  28. Alipour F., Brucker C, Cook D.D., Gommel A, Kaltenbacher M, Mattheus W, Mongeau L, Nauman E, Schwarze R, Toduka I, Zorner S, (2011) "Mathematical Models and Numerical Schemes for the Simulation of Human Phonation" (Review Paper) *Current Bioinformatics*, 6(3), pp. 323-343(21)
  29. Cook, D.D., Nauman, E., and Mongeau, L., (2009) "Ranking vocal fold model parameters by their influence on modal frequencies." *Journal of the Acoustical Society of America*. 126(4), pp. 2002–2010
  30. Cook, D.D. (2009) "Systematic Structural Analysis of Human Vocal Fold Models", PhD Dissertation, Purdue University, August 2009.
  31. Chen, L.J., Zanartu, M., Cook, D.D., Mongeau, L., (2008) "Effects of acoustic loading on the self-oscillations of a synthetic model of the vocal folds." Proceedings of the 9<sup>th</sup> International Conference on Flow Induced Vibrations. June 30- July 3, 2008 Prague, Czech Republic. Zolotarev and Horacek, Eds.
  32. Cook, D.D., Nauman, E., and Mongeau, L., (2008) "Reducing the number of vocal fold mechanical tissue properties: Evaluating the incompressibility and planar displacement assumptions." *Journal of the Acoustical Society of America*. 124(6), pp. 3888-3896.
  33. Cook, D.D., and Mongeau, L., (2007) "Sensitivity of a continuum vocal fold model to geometric parameters, constraints, and boundary conditions." *Journal of the Acoustical Society of America*. 121(4), 2247-2253.
  34. Cook, D.D., (2005) "Computational Models of Fluid Flow, Structural Vibration, and Fluid-Structure Interactions of Human Phonation" Masters Thesis, Purdue University.
  35. Cook, D.D., (2003) "Targeting the Sphere of Influence for a Desired Hyperbolic Orbit" 2<sup>nd</sup> Place Best Paper, American Institute of Aeronautics and Astronautics Region VI Student Conference, April 2003.

## White Papers/Magazine Articles

1. Cook, D.D. (2010), "Corn Stalk Failure Classification." Monsanto Corp internal research report.
2. Weaver, G.C., Haghghi, K., Cook, D.D., Foster, C.J., Moon, S.M., Phegley, P.J., Tormoehlen, R.L., (2008) Attracting Students to STEM Careers – White Paper submitted to the 2007-2013 Purdue University Strategic Planning Steering Committee.
3. Cook, D.D., Nauman, E., and Mongeau, L., "Analytical methods for reducing the number of independent parameters required to model the vocal folds" Proceedings of the COMSOL Conference Oct. 4-6, 2007. Newton, MA. Edited by Dravid, V.
4. Wood, C.G., Perry, T., Cook, D.D., Maxfield, R., Davidson, M., "Mid-Sized Omni-Directional Robot with Hydraulic Drive and Steering" SPIE AeroSense Conference, April 2003

## Invited Talks & Conference Responsibilities

1. Session Organizer, "Cell Wall, Cells, & Tissues", 9<sup>th</sup> Annual Plant Biomechanics Conference, Montreal, Canada, August 10-14, 2018.
2. Cook, D.D. "Stalk Lodging: Insights from Structural Engineering." University of Nebraska, Agronomy and Horticulture Special Seminar, March 15, 2017.
3. Cook, D.D., "The Biomechanics of Corn Stalk Failure." University of Nebraska, Department of Mechanical and Materials Engineering, March 14, 2017.
4. Cook, D.D., "Research progress on Maize stalk lodging" Invited Seminar, Monsanto Company, March 10, 2015.
5. Cook, D.D., "The Biomechanics of Corn Stalk Failure." Texas A&M University, Soil and Crop Sciences Seminar, March 8, 2017.
6. Cook, D.D., "Stalk Lodging: Insights from Structural Engineering." Clemson University, Entomology/Plant & Environmental Sciences/Plant Pathology Seminar Series. March 6, 2017
7. Cook, D.D. "Plant Biomechanics: Listening to Corn Grow and other Tales" Brigham Young University Mechanical Engineering Seminar, March 1, 2017.
8. Cook, D.D., "Research progress on Maize stalk lodging" Invited Seminar, Monsanto Company, Nov 13, 2015.
9. Cook D.D., and Robertson D, "Mechanical measurements of crops and soils: principles and techniques." Workshop. Annual Meeting of Crop Science Society of America, Nov 15-18, 2015 Minneapolis, MN.
10. Cook, D.D. Organizer, special session on "Modeling biological variation, uncertainty, and population responses." Computer Methods in Biomechanics and Biomedical Engineering. Sept 1-5, 2015, Montreal, CA.
11. Cook, D.D. "The transformative potential of applying biomedical engineering expertise to problems in plant sciences" National Science Foundation, Emerging Frontiers in Research and Innovation selection process. Arlington, VA, March 11, 2015.
12. Cook, D.D., "Maize stalk lodging: an Engineering Approach" Invited Seminar, Monsanto Company, Dec 12, 2014.
13. Organizing Committee, 10th International Conference on Voice Physiology and Biomechanics, Salt Lake City, April 24-26, 2014.
14. Cook, D.D., Julias, M.J, Robertson, D.J., Smith, S.L., and Gardunia, B.G. "Biomechanical analysis of stalk failure in Maize." 3rd Computational Biology Workshop, Sainsbury Laboratory at Cambridge University. August 19-30, 2013.
15. Cook, D.D. "Stalk Lodging Biomechanics Research Progress", Invited Talk, Monsanto Company, July 3, 2103.
16. Cook, D.D., and Julias, M.J., "Stalk Lodging Biomechanics", Invited Seminar, Iowa State University, July 12, 2103.

17. D. Cook, I.R. Titze, E. Hunter, E. Nauman, and L.Mongeau, "Best Practices and Benchmark Models for the Improvement of Vocal Fold Modeling Research" Invited Workshop, International Conference on Voice Physiology and Biomechanics, Erlangen Germany, July 2012.
18. Session Chair, Curriculum Innovation, Future of Engineering Education Conference, New York University Abu Dhabi Research Institute Conference, March 18-20, 2012.
19. Cook, D.D., "Updates on: Tracing Stalk Lodging back to Genetics through Biomechanical Structural Analysis" Invited Seminar, Monsanto Company, Feb 11, 2011.
20. Cook, D.D., "Tracing Stalk Lodging back to Genetics through Biomechanical Structural Analysis" Invited Seminar, Monsanto Company, Oct 10, 2010.

#### Conference Presentations

1. Nathaniel Nelson, Christopher J Stubbs, Douglas D Cook, "Method for Finding the Flexural Rigidity of Individual Internodal Regions of Maize Stalks", American Society of Mechanical Engineers International Mechanical Engineering Congress & Exposition, November 11 - 14, 2019. Salt Lake City, UT. (poster)
2. Christopher J Stubbs, Ryan Larson, Douglas D Cook, "A Method for Mapping the Transverse Material Properties of Maize Tissue to Finite Element Models with Computed Tomography", Annual Technical Meeting of the Society of Engineering Science, Oct 13 - 15, 2019. St. Louis, MO.
3. Christopher J Stubbs, Shoiban Braybrook, Douglas D Cook, "All Models Are Not Created Equal: Comparing and Contrasting Two Modeling Paradigms in Mechanobiology", Mechanobiology Annual Symposium, Oct 12, 2019. St. Louis, MO. (poster)
4. Nathanael Nelson, Christopher Stubbs, Douglas D Cook, "Method for Finding the Flexural Rigidity of Individual Internodal Regions of Maize Stalks", King Abdullah University of Science and Technology Winter Enrichment Program, Jan 28 - 29, 2019. Riyadh, Saudi Arabia. (poster)
5. Christopher J Stubbs, Douglas D Cook, Witold de la Chapelle, Ting-Che Lin, Shien Yang Lee, Wenhuan Sun, Daniel J Robertson, "DARLING: A Portable Device for Phenotyping Stalk Bending Strength of Maize and Sorghum", Phenome 2020, February 24-27, 2020. Tucson, AZ (accepted).
6. Christopher J Stubbs, Ryan Larson, Douglas D Cook, "Mapping Spatially Distributed Material Properties in Maize Stem Finite Element Models Using Computed Tomography", American Society of Mechanical Engineers International Mechanical Engineering Congress & Exposition, November 11 - 14, 2019. Salt Lake City, UT.
7. Ryan Larson, Christopher J Stubbs, Douglas D Cook, "A 2-dimensional Parameterized Model for Transverse Deformation of Maize Stems", American Society of Mechanical Engineers International Mechanical Engineering Congress & Exposition, November 11 - 14, 2019. Salt Lake City, UT.
8. Christopher J Stubbs, Douglas D Cook, Witold de la Chapelle, Ting-Che Lin, Shien Yang Lee, Wenhuan Sun, Daniel J Robertson, "Stalk Lodging: A Portable Device for Phenotyping Stalk Bending Strength of Maize and Sorghum", American Society of Agronomy - Crop Science Society of America - Soil Science Society of America International Annual Meeting, November 10 - 13, 2019. San Antonio, Texas (accepted).
9. Ryan Larson, Christopher J Stubbs, Douglas D Cook, "Factors influencing transverse deformation of maize stems", Annual Technical Meeting of the Society of Engineering Science, Oct 13 - 15, 2019. St. Louis, MO. (poster)
10. Christopher J Stubbs, Ryan Larson, Wenhuan Sun, Douglas D Cook, "A Computational Approach to Determine the Parameters that Influence Maize Stem Buckling Failure", American Society of Agricultural and Biological Engineers Annual International Meeting, July 7 - 10, 2019. Boston, MA.
11. Christopher J Stubbs, Wenhuan Sun, Douglas D Cook, "Brazier Buckling in Grain Stems: Modeling and Understanding the Role of Functional Grading and Other Structural

- Characteristics”, Technical Presentation, ASME International Mechanical Engineering Congress & Exposition, Nov 9 - 15, 2018. Pittsburgh, PA
12. Christopher J Stubbs, Douglas D Cook, “Poacea (grain) plant stems: modelling and analysis of functional grading”, Technical Presentation, Society of Engineering Science, Oct 10 - 12, 2018. Madrid, Spain
  13. Christopher J Stubbs, Loay Al Zube, Wenhuan Sun, Douglas D Cook, “Including spatial variation of tissue properties in computational models of plant stems”, Technical Presentation, Plant Biomechanics Conference, Aug 9 - 14, 2018. Montreal, Canada
  14. Christopher J Stubbs, Douglas D Cook, “A methodology for determining the role of the leaf sheath on the strength of maize stalks”, Flashtalk, Plant Biomechanics Conference, Aug 9 - 14, 2018. Montreal, Canada
  15. Christopher J Stubbs, Douglas D Cook, “Determining the transverse Young’s modulus of maize stems using specimen-specific finite element models and computed tomography”, Flashtalk, Plant Biomechanics Conference, Aug 9 - 14, 2018. Montreal, Canada
  16. Loay Al Zube, Wenhuan Sun, Christopher J Stubbs, Daniel Robertson, Douglas D Cook, “Measuring the modulus of elasticity of maize stems”, Flashtalk, Plant Biomechanics Conference, Aug 9 - 14, 2018. Montreal, Canada
  17. Christopher J Stubbs, Douglas D Cook “Determining the Role of the Leaf Sheath on the Strength of Corn Stalks”, Technical Presentation, American Society of Agricultural and Biological Engineers, Jul 29 - Aug 1, 2018. Detroit, MI (**Oral/Poster Competition Winner**)
  18. Christopher J Stubbs, Douglas D Cook, “Determining the Transverse Young’s Modulus of Maize through Computed Tomography-Driven Finite Element Modeling of Compression Testing”, Technical Presentation, ASME International Mechanical Engineering Congress & Exposition, Nov 3 - 9, 2017. Tampa, FL
  19. Cook DD, “You really can hear the corn grow! Acoustic emissions in the growth and breakage of maize.” 5th Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan, 28 November-2 December 2016, Honolulu, Hawaii.
  20. Cook DD, Julias M, Lee SY and Robertson DJ, “Maize Stalk Lodging: The Governing Effects of Stalk Morphology” Crop Science Society of America Annual Meeting, Nov. 6-9, 2016. Phoenix, AZ.
  21. Robertson DJ, Lee SY and Cook DD, Julias M, “An Instrumented Push Test to Inform Harvesting Decisions in Maize.” Crop Science Society of America Annual Meeting, Nov. 6-9, 2016. Phoenix, AZ.
  22. Cook DD., Robertson DJ, “Patient-specific modelling in the absence of materials property data: Combining experimental and computational techniques to gain insights.” Computer Methods in Biomechanics and Biomedical Engineering, Sept. 20-22, 2016. Tel-Aviv Israel.
  23. Robertson DJ, Cook DD., “The generic modelling fallacy: is it happening in your lab?; Daniel Robertson.” Computer Methods in Biomechanics and Biomedical Engineering, Sept. 20-22, 2016. Tel-Aviv Israel.
  24. Robertson DJ, Julias M, and Cook DD, “Forensic Analysis of Maize Stalk Lodging” Annual Meeting of the Botanical Society of America, July 30-Aug 3 2016, Savannah, GA.
  25. Robertson DJ, and Cook DD, “A Structural Engineering Perspective on the Functional Anatomy of Maize” Annual Meeting of the Botanical Society of America, July 30-Aug 3 2016, Savannah, GA.
  26. Robertson DJ, Julias M, and Cook DD, “Geometric and Material Effects of Crowding Stress in Maize” Annual Meeting of the Botanical Society of America, July 30-Aug 3 2016, Savannah, GA.
  27. Cook DD, Robertson D, Lee SY, and Von Forell G, “The influence of tissue and morphology on stalk bending stresses.” Plant Biomechanics, Nov 29-Dec3, 2015, Nagoya, Japan.
  28. Robertson D, Julias M, Lee SY, and Cook DD, “Nondestructive predictors of stalk and stem strength.” Plant Biomechanics, Nov 29-Dec3, 2015, Nagoya, Japan.
  29. Julias M, Robertson D, Gardunia BW, and Cook DD, “Forensic analysis of stalk failure in maize.” Plant Biomechanics, Nov 29-Dec 3, 2015, Nagoya, Japan.

30. Julias M and Cook DD, "Structural Role of Leaf Sheath." Plant Biomechanics, Nov 29-,Dec 3, 2015, Nagoya, Japan.
31. Cook DD, "Rind Penetration Resistance: What Does it Measure?" Annual Meeting of Crop Science Society of America, Nov 15-18, 2015 Minneapolis, MN.
32. Lee, SY, Robertson D, and Cook DD, "A novel device for quantifying maize stalk lodging propensity", Annual Meeting of Crop Science Society of America, Nov 15-18, 2015, Minneapolis, MN. Undergraduate Research Contest Award.
33. Robertson D, Julias M, and Cook DD, "Quantifying the effects of planting density in maize: a structural engineering investigation." Annual Meeting of Crop Science Society of America, Nov 15-18, 2015 Minneapolis, MN.
34. Robertson D and Cook DD, "Stalk lodging: flexural rigidity is a novel and robust predictor of stalk strength." Annual Meeting of Crop Science Society of America, Nov 15-18, 2015, Minneapolis, MN.
35. Robertson D and Cook DD, "The unrecognized determinants of stalk strength" Annual Meeting of Crop Science Society of America, Nov 15-18, 2015, Minneapolis, MN.
36. Julias M, Robertson D, Cook DD "Failure initiation and propagation in corn stalk tissue." Annual Meeting of Crop Science Society of America, Nov 15-18, 2015, Minneapolis, MN.
37. Cook, D.D, Zanartu, M., Robertson, D.J., "Population-based sensitivity analysis of a two-mass model of the vocal folds." 11<sup>th</sup> International Conference on Advances in Quantitative Laryngology, Voice and Speech Research, April 8-9, 2015. London, UK.
38. Cook D.D., Smith, S., and Robertson, D. "Advancing our understanding of biomechanical models through sensitivity analysis." Computer Methods in Biomechanics and Biomedical Engineering. Sept 1-5, 2015, Montreal, CA.
39. Robertson D, and Cook D.D., "Hyperelasticity and the failure of averages." International Conference on Civil, Structural, and Environmental Engineering Computing, Prague, Czech Republic, Sept 1-4, 2015.
40. Robertson D, Julias M, Lee S, Cook D. "The underutilized potential of mechanical engineering analyses in botany research." Botany, Edmonton, Canada, July 25-29, 2015.
41. Lee S, Robertson D, Julias M, Cook D. "Non-destructive mechanical measurement techniques to predict strength." Botany, Edmonton, Canada, July 25-29, 2015. *3rd place oral presentation student award.*
42. Robertson D. "A non-destructive method for predicting corn stalk failure." Congress of the European Society of Biomechanics. Prague, Czech Republic, July 5-8, 2015.
43. Julias, M, Robertson, DJ, and Cook DD, "Engineering Analysis Provides New Insights into Corn Stalk Failure", Congress of the European Society of Biomechanics. Prague, Czech Republic, July 5-8, 2015.
44. Julias, M and Cook DD, "Failure Characterization of Corn Stalk Tissue", Congress of the European Society of Biomechanics. Prague, Czech Republic, July 5-8, 2015.
45. Robertson, D., and Cook, D.D., "The Erratic Behavior of Average Models." Computer Methods in Biomechanics and Biomedical Engineering. Sept 1-5, 2015, Montreal, CA.
46. Cook, D.D., Gardunia, B.G., Julias, M, and Robertson, D.J., "Maize Stalk Lodging: A Structural Engineering Approach", Crop Science Society of America Annual Meeting. Long Beach, CA. Nov 4-7, 2014.
47. Cook, D.D., Gardunia, B.G., Robertson, D.J., and Julias, M, "An Important Step Toward Solving Maize Lodging: Engineering Failure Analysis Identifies a Consistent Stalk Weakness". Crop Science Society of America Annual Meeting. Long Beach, CA. Nov 4-7, 2014.
48. Julias, M., Nauman, E., and Cook, D. "Are We Overlooking the Influential Role of Biological Variation in Biomechanics Research?" 12th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering. Amsterdam, October 13 - 15, 2014.



49. Robertson, D., and Cook, D. "The pervasive problem of averaging failure in biomechanics models" 12th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering. Amsterdam, October 13 - 15, 2014.
50. Cook, D. "Productive collaboration between plant scientists and engineers: a case study" American Society of Plant Biology Annual Meeting, Portland, OR, July 13-16, 2014.
51. Julias, M., Nauman, E., and Cook, D. "A Meta-Analysis on Biological Variation in Simulations: Importance and Current Modeling Practices. SIMBIO-M, Marseille, France. June 19-20, 2014.
52. Smith, S.L., Cook, D.D., and Hunter, E.J. "Sensitivity Analysis of a viscoelastic laryngeal muscle model" International Conference on Voice Physiology and Biomechanics. Salt Lake City, Utah. April 10-12, 2014
53. Cook, D.D. "The Implementation Bottleneck: Identifying Factors and Solutions to Implementing Change in Engineering Education" International Engineering and Technology Education Conference, Ho Chi Minh City, Vietnam, November 3-6, 2013.
54. Cook, D.D., Julias, M., and Nauman, E. "The importance of biological variation: A meta-analysis of biomechanics modeling practices." 19<sup>th</sup> Congress of the European Society of Biomechanics. Patras, Greece, August 25-28, 2013.
55. Cook, D.D., Julias, M., Robertson, D.J., Smith, S.L., and Gardunia, B.G. "Biomechanical analysis of stalk failure in Maize." 3rd Computational Biology Workshop, Sainsbury Laboratory at Cambridge University. August 19-30, 2013.
56. Cook, D.D., Julias, M., and Nauman, E "Biological Variation in Biomechanical Simulations: A Meta-analysis of Current Modeling Practices" 11<sup>th</sup> International Symposium, Computer Methods in Biomechanics and Biomedical Engineering. Salt Lake City, Utah, April 3-6, 2013.
57. Julias, M., Riede, T., and Cook, D., "Visualizing Collagen Orientation within Human and Rhesus Monkey Vocal Folds using Polarized Light Microscopy", International Congress of World Voice Consortium. Luxor, Egypt, Oct 27-31, 2012
58. Cook, D.D., and Gardunia, B.G., "Structural sensitivity analysis and model comparisons of Zea Mays stalk flexibility", 7th Biannual Plant Biomechanics, Clermont-Ferrand, France. August 20-24, 2012.
59. Cook, D.D. "The Importance of Biological Variation in Vocal Fold Research", Oral Presentation, International Congress on Voice Physiology and Biomechanics, Erlangen Germany, July 7, 2012.
60. D. Cook, I.R. Titze, E. Hunter, E. Nauman, and L. Mongeau, "Best Practices and Benchmark Models for the Improvement of Vocal Fold Modeling Research" Invited Talk, International Conference on Voice Physiology and Biomechanics, Erlangen Germany, July 2012.
61. George, P.G., and Cook, D.D., "Comprehensive sensitivity analysis of a two-mass model of vocal fold vibration", The Voice Foundation's 41st Annual Symposium: Care of the Professional Voice, Philadelphia, PA, June, 2012.
62. Cook, D.D., "The complex role of biological uncertainty and variability in biomechanical modeling" Invited Talk, NYU International Voice Symposium, January 2012.
63. Cook D, George P, Julias M "A two-dimensional/three-dimensional hybrid structural model of the vocal folds" 162<sup>nd</sup> Meeting of the Acoustical Society of America, San Diego, CA, Oct 31- Nov 4, 2011.
64. Cook D, George P, Julias M "2D/3D Hybrid Structural Model of Vocal Folds" 35th Annual Meeting of the American Society of Biomechanics, Long Beach CA, August 10-13, 2011 (Best Computational Paper Award)
65. Cook, D.D. and Zañartu, M. "Physical Relations Between Continuum and Lumped Mass Models of Vocal Fold Vibration", The Voice Foundation's 40th Annual Symposium: Care of the Professional Voice, Philadelphia, PA, June, 2011.
66. Julias, M., Riede, T., and Cook, D.D. "Visualizing Collagen Orientation Within Focal Volds Using Polarized Light Microscopy", The Voice Foundation's 40th Annual Symposium: Care of the Professional Voice, Philadelphia, PA, June, 2011.

67. Cook, D. D. and Zañartu, M. "Toward patient-specific vocal fold models: Objective determination of lumped vocal fold model parameters from continuum vocal fold models, International Conference on Voice Physiology and Biomechanics, Madison WI, July 2010.
68. Cook, D.D., and Zanartu, M., (2008) "A preliminary study on deriving optimal low-order vocal fold models from high-order finite element models." Biomedical Engineering Society Annual Fall Meeting, October 2-4, 2008. St. Louis, MO. (poster)
69. Foertsch, K., Mroozian, B., Myrent, N., and Cook, D.D., (2008) "Physical model of the human vocal system." First International Symposium on Audible Acoustics in Medicine and Physiology. September 8-9, 2008. West Lafayette, IN. (poster)
70. Cook, D.D., Nauman, E., and Mongeau, L., (2008) "Parametric evaluation of vocal fold model sensitivities using population profiles." The 6<sup>th</sup> International Conference on Voice Physiology and Biomechanics. Tampere, Finland, August 6-9 2008. (oral)
71. Cook, D.D., Nauman, E.A., Mongeau, L., (2007) "Structural analysis of a three-layered vocal fold model." 153<sup>rd</sup> Meeting of the Acoustical Society of America, Salt Lake City, June 4-8 2007. (poster)
72. Cook, D.D., Mongeau, L., Smith, P. (2006) "Finite-element simulations of self-oscillation mechanisms in human phonation." 151<sup>st</sup> Meeting of the Acoustical Society of America, Providence, RI, June 5-9 2006. (oral)
73. Cook, D.D., Mongeau, L., (2005) "The influence of modeling assumptions on the modal analysis of a vocal fold model" 150<sup>th</sup> Meeting of the Acoustical Society of America, Monneapolis, MN, October 17-21, 2005. (oral)
74. Cook, D.D., Mongeau, L.,(2005) "Investigating Basic Vocal Fold Mechanics via Modal Analysis." 10th International Congress on Surgical & Prosthetic Rehabilitation after Laryngectomy, Groningen, The Netherlands, April 17-20 2005 (oral)

## HONORS AND AWARDS

(As Advisor) Undergraduate Research Contest Award, Annual Meeting of Crop Science Society of America, 2015.

Best Computational Paper, American Society of Biomechanics Annual Meeting, August 2011.

Outstanding PhD Student, Purdue University, 2009

ASME National Teaching Fellow 2008-2009

Bilsland Fellow, Purdue University, 2007-2008

East Asia and Pacific Summer Institute Fellow, National Science Foundation, 2005

Graduate Teaching Certificate, Purdue University, May 2004

Purdue Graduate School Incentive Grant (2004, 2005)

Physiology and Acoustics of Singing Travel Grant

Second Place Undergraduate Research Paper Award, AIAA Region VI Student Conference, April, 2003

Baker-Hughes Scholarship in Engineering, August 2001

## PROFESSIONAL SOCIETY MEMBERSHIPS

American Society of Mechanical Engineers

European Society of Biomechanics

Acoustical Society of America

American Society of Plant Biologists

American Society of Crop Science

## ACADEMIC SERVICE

### Invited Reviewer:

*Agronomy*  
*Plant Methods*  
*Bioenergy Research*  
*Crop Science*  
*Journal of Biomechanics*  
*Journal of the Acoustical Society of America*  
*Medical Engineering and Physics*  
*International Journal for Numerical Methods in Biomedical Engineering*  
*Computer Methods and Programs in Biomedicine*  
*Computers and Electronics in Agriculture*  
*University of Nebraska Internal Funding Proposal Reviewer*  
*National Science Foundation*

### University-Level

BYU General Education Design Committee (Jan-Sept. 2020)  
BYU General Education Design Committee Steering Committee (Jan-Sept. 2020)  
NYU Abu Dhabi Core Curriculum Committee (2015-2017)  
NYU Abu Dhabi Curriculum Committee (2011-12, 2012-13, 2013-14)  
NYU Abu Dhabi Academic Affairs Committee (2009-10, 2010-2011)  
NYU Abu Dhabi Online Evaluations Committee  
Purdue University Strategic Plan Committee: *Attracting Students to STEM Careers*  
Education Resource Committee Member  
Provost's Mentoring Award Review Committee  
Outstanding Graduate Student Review Committee

### College and School-Level

Mechanical Engineering Sweet Talks:  
1/10/20 "Learning and Grades", and 1  
1/16/20, "A Discussion on Studying and Learning."  
11/22/19, "Crop Biomechanics."  
9/7/18, "Study Skills and Success in Mechanical Engineering."  
BYU Faculty Search Committee Member (2018-2019)  
BYU PhD Qualifying Exam Committee Member (2018-2020)  
BYU Biomedical Engineering Feasibility Committee (2018-2020)  
BYU Three-Minute Thesis Judge  
  
NYU Abu Dhabi/Poly Faculty Program Curriculum Committee, Mechanical Engineering  
Engineering Grievance Committee (Chair, 2013-14)  
NYU Abu Dhabi Engineering Curriculum Committee (2009-10, 2010-11, 2011-12, 2012-13)  
NYU Abu Dhabi Engineering Faculty Hiring Committee (2009-10, 2011-12, 2012-13)  
NYU Abu Dhabi Engineering Student Feedback Survey, Lead Designer  
NYU Abu Dhabi Undergraduate Mentor,  
Advisor for Engineering Projects in Community Service, Purdue University  
Instituted an ongoing Teaching Assistant Evaluation program, Purdue University  
Committee for Educating Engineering Teaching Assistants (CEETA), Purdue University  
Engineering Advisory Council,  
Mechanical Engineering Advisory Council  
College of Engineering Strategic Planning Committee  
Strategic Planning Subcommittee on STEM Education, Purdue University

## MENTORING

### Undergraduate Senior Capstone Advising

- “A synthetic model of the human vocal tract” Purdue University, 2008-2009.
- “A revised synthetic model of the human vocal tract” New York University, 2009- 2010.
- “A device for measuring corn stalk strength” New York University Abu Dhabi, 2015- 2016
- “An improved device for measuring crop strength” New York University Abu Dhabi, 2016-2017
- “A device for measuring the flow profile above and within a crop canopy” Purdue University, 2016-2017.
- “Electronic platform for mechanical phenotyping of crops.” Brigham Young University, 2018-2019.
- “Assessment of maize cross-sectional morphology.” Brigham Young University, 2018-2019
- “Automated platform for measuring X-ray focal spot size”, Brigham Young University, 2019-2020

### Graduate Students

- Michael Ottesen, MS, Brigham Young University, September 2020 - present
- Nan-Wei Liu, PhD, Brigham Young University, September 2020 - present
- Christopher Stubbs, PhD. Mechanical Engineering, NYU Tandon School of Engineering, August 2019
- Ryan Larson, M.S., Mechanical Engineering, Brigham Young University, April 2020

### Undergraduate Researchers

#### New York University Abu Dhabi

- |                 |                        |
|-----------------|------------------------|
| Shien Yang Lee  | Jean Edwards           |
| Israel Diresta  | Ting-che Lin           |
| Pearl Rwauya    | Witold de la Chappelle |
| Zoha Alvi       | Kyler Meehan           |
| Levan Asantiani | Judy Wang              |

#### Brigham Young University

- |                    |                          |
|--------------------|--------------------------|
| Amelia Benedict    | Julia Elmer              |
| Jonathan Peterson  | Caleb Groves             |
| Michael Yancey     | Aaron Lewis              |
| Joe Hansen         | Ryan Clark               |
| Rachel Jones       | ChungShan (Richard) Liao |
| Nathanael Nelson   | Mickelle Tanner-Wood     |
| Ivy Running        | Daniel Budge             |
| Jacob Child        | Jared Hale               |
| Brandon Sutherland | Spencer Webb             |
| Nathan Hale        |                          |