

# Tian Yu

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## RESEARCH INTERESTS

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Mechanics of thin rods, strips, and sheets; Nonrigid origami; Mechanics of elastic rod/strip networks.

## PROFESSIONAL EXPERIENCE

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**Princeton University**, Princeton, NJ, USA

Postdoctoral Associate, Civil and Environmental Engineering, Feb 2020 - present

Advisor: Sigrid Adriaenssens

## EDUCATION

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**Virginia Tech**, Blacksburg, VA, USA

PhD, Engineering Mechanics, Dec 2019

Advisor: James Hanna

Dissertation: Bifurcations, multi-stability, and localization in thin structures

**Zhejiang University**, Hangzhou, China

MS, Structural Engineering, Jun 2014

**Beihang University**, Beijing, China

BS, Civil Engineering, Jun 2011

## PUBLICATIONS

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7 **T. Yu**. Bistability and equilibria of creased annular sheets and strips. *submitted*, 2021. [[arXiv preprint](#)]

6 **T. Yu**, L. Dreier, F. Marmo, S. Gabriele, S. Parascho, S. Adriaenssens. Numerical modeling of static equilibria and bifurcations in bigons and bigon rings. *Journal of the Mechanics and Physics of Solids*, 2021. [[Full paper](#)] [[arXiv preprint](#)]

5 **T. Yu**, I. Andrade-Silva, M. A. Dias, J. A. Hanna. Cutting holes in bistable folds. *Mechanics Research Communications*, 2021. [[Full paper](#)] [[arXiv preprint](#)]

4 **T. Yu**, J. A. Hanna. Exact and approximate mechanisms for pure bending of sheets. *Mechanism and Machine Theory*, 149: 103805, 2020. [[Full paper](#)] [[arXiv preprint](#)]

3 N. P. Bende, **T. Yu**, N. Corbin, M. A. Dias, C. D. Santangelo, J. A. Hanna, R. C. Hayward. Overcurvature induced multistability of linked conical frusta: how a 'bendy straw' holds its shape, *Soft Matter*, 14(42): 8636-8642, 2018. [[Full paper](#)] [[arXiv preprint](#)]

2 **T. Yu**, J. A. Hanna. Bifurcations of buckled, clamped anisotropic rods and thin bands under lateral end translations, *Journal of the Mechanics and Physics of Solids*, 122: 657-685, 2019. [[Full paper](#)] [[arXiv preprint](#)]

1 **T. Yu**, F. L. Guan and L. Dai. Design and analysis of bidirectional deployable parabolic cylindrical antenna, *Journal of Zhejiang University SCIENCE A*, 15(2): 83-96, 2014. [[Full paper](#)]

## PATENTS

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J. A. Hanna, **T. Yu**, W. Hartley, N. Corbin. Mechanism for pure bending of sheets, US Provisional Patent. No.: 62/671,154.

## TALKS AND PRESENTATIONS

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### Invited Talks

Bistability and equilibria of creased annular sheets and strips, May 2021  
SIAM Conference on Mathematical Aspects of Materials Science, online

Numerical modeling of bifurcations and equilibria in elastic strip networks, April 2021  
E-Micrus Forum, University of Science and Technology of China

Destroy bistability in folded thin sheets by removing the singularity, Nov 2020  
Engineering and Applied Science Forum, online

Multistability and bifurcations of thin structures, August 2017  
Dynamics workshop, Virginia Tech

### CONTRIBUTED TALKS

Static equilibria and bifurcations of interlaced bigon rings, Mar 2021  
APS March Meeting, online

Numerical modeling of static equilibria and bifurcations in elastic strip networks, Sep 2020  
Society of Engineering Science 57th Annual Technical Meeting, online

Bistability of creases under removal of singularities, Oct 2019  
Society of Engineering Science 56th Annual Technical Meeting, Washington University, St. Louis, MO

Pleat formation and the geometry of pure bending, Mar 2019  
APS March Meeting, Boston, MA

Bending of soft sheets, Jun 2018  
18th U. S. National Congress for Theoretical and Applied Mechanics, Chicago, IL

Bifurcations of anisotropic rods and strips, Mar 2017  
APS March Meeting, New Orleans, LA

Multi-stability and bifurcations of thin bands, Oct 2016  
Society of Engineering Science 53rd Annual Technical Meeting, University of Maryland, College Park, MD

Multi-stability and bifurcations of thin bands, Aug 2016  
24th International Congress of Theoretical and Applied Mechanics, Montreal, Canada

Multi-stability and bifurcations of a thin band, Mar 2016  
APS March Meeting, Baltimore, MD

Multi-stability and bifurcations of thin bands, Nov 2015  
Third Annual Virginia Soft Matter Workshop, Charlottesville, VA

### POSTER PRESENTATIONS

Manipulation of looping behavior in interlaced ribbon networks by unbending, Sep 2020  
Society of Engineering Science *Virtual* Technical Meeting

Multi-stability and bifurcations of thin bands, Jan 2016  
XXXV Dynamics Days US, Duke University, Durham, NC

Multi-stability and bifurcations of thin bands, May 2016  
Soft solids and complex fluids summer school, UMass Amherst, MA

## Honors and Awards

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Best paper for technical merit, The Nonwovens Institute at NC State University, Dec 2019

## MENTORING, TEACHING AND OUTREACH

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*Graduate student mentoring*, Princeton University, 02/20 - present

Mentored one Master and one PhD student on the numerical modeling and experimental tests of multistable elastic strip/rod networks.

*Undergraduate mentoring*, Virginia Tech, 2017 - 2019

Mentored four Virginia Tech undergraduates on their experimental work. Topics included testing bistability of creases under removal of singularities, capturing cascade instabilities of thin buckled sheets with high speed camera, and analyzing and designing a pure bending mechanism.

GEMS (Graduate Engineering Mechanics Society) workshop, Virginia Tech, Dec 2017

Delivered a lecture titled "Getting practice with continuation software AUTO 07P".

*Volunteer*, Kids' Tech University, Virginia Tech, Mar 2017

Demonstrated multi-stable toys (ribbons, straw, folded paper, etc.) to kids.

*Teaching Assistant*, Intermediate Dynamics, Virginia Tech, Fall 2016

*Teaching Assistant*, Mechanical Behavior of Materials, Virginia Tech, Spring 2015

## RELATED PROFESSIONAL EXPERIENCE

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Advanced Summer School on Continuation Methods for Nonlinear Problems, Aug 2018

University of Illinois at Urbana-Champaign (UIUC), Urbana, IL

Geometry and topology in contemporary material science, Sep 2017

International PhD school, Niels Bohr Institute, Copenhagen, Denmark

Soft solids and complex fluids summer school, May 2016

UMass Amherst, MA

APS student membership

Reviewer for academic journals: Aerospace Science and Technology; Extreme Mechanics Letters; Nonlinear Dynamics; International Journal of Solids and Structures