Yao Ren

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EDUCATION

PhD in Mechanical & Aerospace Engineering (GPA: 3.5/4.0)
2008–2016, Oklahoma State University
Thesis: *The Wound-On-Tension of Winders with Nip Rollers*

MS with Honors in General Mechanics & Foundation of Mechanics (GPA: 3.6/4.0)
2006–2008, Beijing Institute of Technology
Thesis: *Numerical Simulations and Parameter Optimization for Rotary Draw Bending of Tubes*

BS with Honors in Vehicle Engineering (All GAP: 3.8/4.0, Core Curriculum 4.0/4.0)
2002–2006, Beijing Institute of Technology
Thesis: *Online Dynamic Monitoring System for the Rotor of Vehicle Superchargers*

EXPERIENCE

08.2008–06.2017	**Research Assistant** under Dr. Hongbing Lu, Dr. J.K. Good, Oklahoma State University
09.2007–02.2008	**Teaching Assistant** for Engineering Mechanics, Beijing Institute of Technology
09.2006–07.2008	**Research Assistant** under Dr. Xiaoning Liu, Beijing Institute of Technology
02.2006–03.2006	**Intern** @ First Automobile Works (FAW) Group, Changchun, China

SELECTED HONORS

- Best Paper Award, 10th IWEB Conference, 2009
- Special Award, BIT Structure Competition, 2007
- Outstanding Undergraduates Fellowship, 2002–2006
- Excellent Master's Thesis, 2008
- Excellent Bachelor's Thesis, 2006

TOOLBOX

Theoretical	Continuum | Structure | Composite | Contact | Thermal mechanics, Nonlinear FEM
Material	Linear nonlinear (hyper, hypo) elasticity, Plasticity, Viscoelasticity, Fatigue, Damage
Numerical	Abaqus (9.5/10), ANSYS (8/10), LS-DYNA (8/10), MATLAB (7/10), COMOSL (6/10)
FEA Processing	HyperMesh (8/10), LS-PrePost (8/10), ParaView (7/10)
Coding	Python (9.5/10), Visual Basic/VBA (8/10), C/C++ (7/10), Fortran (6/10), HTML (7/10)
2/3D Modeling	AutoCAD (8/10), SOLIDWORKS (8/10), Blender (6/10)
Common	Microsoft Office, LaTex, Basic Linux/Unix operation, Operating forklifts, Photography

SELECTED PUBLICATIONS & PRESENTATIONS

1. **Y. Ren** and J.K. Good, "The Nip Mechanics of Nano-Impression Lithography in Roll-to-Roll Process Machines", Proceedings of the 14th International Conference on Web Handling, Stillwater, OK, 2017
2. J.K. Good, **Y. Ren**, and J. Shi, "Boundary Conditions for Lateral Deformation of Webs Transiting Rollers in Roll-to-Roll Process", Proceedings of the 14th International Conference on Web Handling, Stillwater, OK, 2017
3. **Y. Ren**, B. Kandadai, and J.K. Good, "Center Winding versus Surface Winding: the Effect of Winder Type and Web Material Properties on Wound Roll Stresses", Proceedings of 15th Fundamental Research Symposium, Cambridge, UK, 2013
4. H. Lu, V. Bhumannavar, J. Liang and **Y. Ren**, "Measurement of Web Surface Profiles Using Fringe Projection", Proceedings of the 10th International Conference on Web Handling, Stillwater, OK, 2009
5. **Y. Ren** and J.K. Good "The Impact of Winding Webs with Flexible and Printed Electronics", presented at the International Conference on Flexible and Printed Electronics, Jeju, Korea, 2013

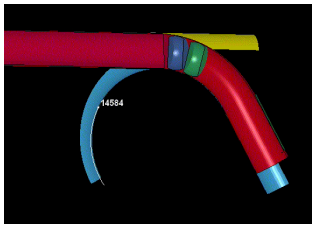
SELECTED PROJECTS

Numerical Simulation and Parameter Optimization for Rotary Draw Bending of Tubes

Tech Tags

Date: 06.2007–06.2008 | My role: main modeling analyst

Rotary draw bending of tubes is a severe nonlinear process that involves large rotation, metal plasticity, and complex contacts. We used LS-DYNA and ANSYS APDL as the solver and pre-process tool to implement a quasi-static parametric FE model. We analyzed stress-strain, thickness variation, section distortion, and wrinkling of tubes under certain working conditions, and conducted processing parameters optimization. The model was delivered to China Aerospace Industry and Corporation and was integrated into the tube design and manufacturing process. More details on http://yaor.me/portfolio/tube-bending-simulations/

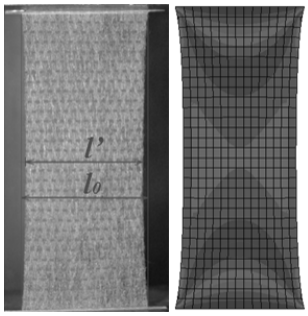


#Contact
#Explicit
#Quasi-static
#Implicit
#Springback
#APDL
#ANSYS
#LS-DYNA

Material Calibration of Spunbond Nonwoven Using Inverse FEM

11.2008 | The only modeling analyst and experimentalist

Nonwoven's severe necking phenomenon in uniaxial tensile tests and extreme low resistance to shear buckling make an accurate measurement of Poisson's ratio and shear modulus difficult. We proposed a practical way that is based on fitting the deformed shape of sample in uniaxial tensile tests with an inverse FEA procedure, and avoided the direct measurements of those parameters. This method provides accurate material parameters for modeling of nonwovens. More details on http://yaor.me/portfolio/nonwoven-calibration/.

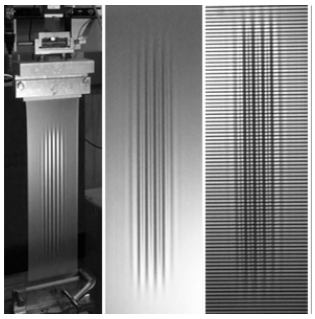


#Constitutive Modeling
#Static
#Abaqus
#Measurements

Measurement of Web Surface Profiles Using Fringe Projection

01.2009–06.2009 | One of two main experimentalists

Traditional methods on measuring surface profiles in web handling area fail to provide high accuracy and efficiency at the same time. We explored the fringe projection technique and developed a system consisting of a projector and a digital camera that produced non-contact, full-field measurement of surface profile with high accuracy. More details on http://yaor.me/portfolio/fringe-projection-web-surface/.

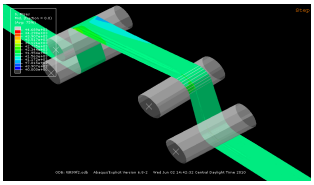


#Instron
#Tensile Tests
#Fringe Projection
#Lab Skills
#Measurements

Dynamic Simulations of Instability of Web due to Misaligned Roller

01.2010–06.2010 | The only modeling analyst

A misaligned roller in a web line steers the web laterally until a normal entry condition is achieved. The shear forces developed between the web and misaligned roller may cause instability of web in spans or on rollers. We used explicit finite element analysis to investigate the instability of web due to a misaligned roller. Simulations revealed the evolution of instabilitiy—from troughs to a wrinkle to a foldover on the roller. The work was later extended to help develop a failure criterion for misaligned roller in a web line. More details on http://yaor.me/portfolio/misaligned-roller-simulations/.



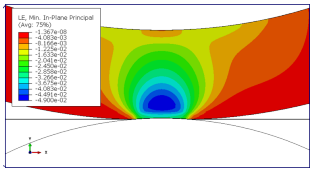
#Contact
#Connector Modeling
#Explicit
#Abaqus

Dynamic Simulations of Nip Mechanics in Web Transporting

Tech Tags

Date: 07.2014–11.2014 | My role: the only modeling analyst

A nip set consisting of two nip rollers is widely used in web lines to adjust web line tension, conduct lamination, and etc. We developed implicit dynamic Abaqus model and studied nip mechanics problem, specially, how nip loads and rubber cover properties affect the tension and velocity for different BCs and nip set configurations. More details on http://yaor.me/portfolio/nip-mechanics/.

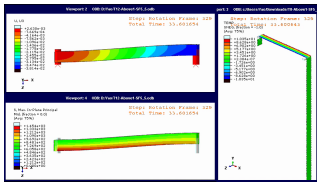


#Implicit Dynamic #Contact #Abaqus

Dynamic Simulations of Lateral Mechanics of Web Camber

06.2015–01.2017 | The only modeling analyst

A cambered web is a web with cast-in curvature. It causes lateral steering issues in transmitting. We developed an implicit dynamic FE model and studied the mechanics of cambered web. A new thermal method of effective modeling of cambered web was developed. This study revealed the steering behavior of cambered web and resolved long time arguments on boundary conditons of cambered web in steady state in a web line. More details on http://yaor.me/portfolio/camber-web-simulations/.

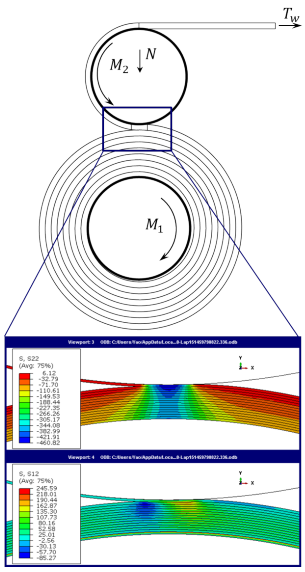


#Implicit Dynamic #UTEMP #Contact #Abaqus

Wound-on-tension of Winders with Nip Rollers

07.2011–07.2016 | The only modeling analyst and main experimentalist

The Wound-On-Tension (WOT) is the tension in the outermost lap of a winding roll. It is the most influential parameter which determines the wound roll stresses. The WOT is dependent of winder types, material properties of web, winding parameters, and geometry of winders. We developed a parametric explicit model to account for all those aspects. Winder types of pure center winder, center winder with nip, surface winder, and hybrid winder were studied. Web material properties are known to be state dependent and was accommodated by implementing a user subroutine VUMAT in Abaqus. New test methods were developed for out-of-plane shear modulus. The model was validated by experiments. This study provides a predictive tool of WOT for web handling engineers. More details on http://yaor.me/portfolio/wound-on-tension/.

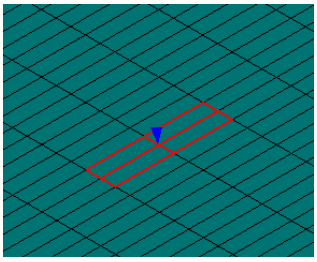


#Contact #Constitutive Modeling #VUMAT #Explicit #Abaqus #Python #Lab Skills #Measurements

Abaqus Python Scripts Extract Time History of Eulerian Results

10. 2017 | The only developer

The default post-processing tools in Abaqus only extracts field outputs at Lagrangian mesh. There is no easy way to extact the time history of field results at spatial locations if the material has large displacments. I develped Python scripts that can automatically extract time history of results at spatial locations, which saves labor effort of analysts so they can focus on core physical problem solving. Source code can be found on https://github.com/yaor42/EulerianExtractor/.



#Python #Scripting #Abaqus