



Professor Changguo Wang

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Nanoscale Wrinkling

Biography:

Prof. Changguo Wang was born in Dalian, China, in 1979. He received the BS degree in Engineering Management from Shenyang Jianzhu University, China in 2001; the ME and PhD degrees in Engineering mechanics from Harbin Institute of Technology, China in Mar. 2004 and Mar. 2007, respectively. From Nov. 2007 to Dec. 2009, he was a lecturer in the Department of Mechanical Engineering, Harbin Institute of Technology. From Aug. 2009 to Nov. 2009, he was a visiting scholar in Institute of Lightweight Structures, Technische Universität München. He is currently a Professor since Dec. 2013 and Ph. D supervisor since Apr. 2012. Prof. Wang gained Nomination Award of top 100 outstanding doctoral dissertations in China (2009) and selected as the "New Century Excellent Talents in University", the Ministry of Education of China (2011). His current research interests include Flexible Materials and Structures (Mechanical Issues on near Space Aerostats and Membrane Structures of Aircrafts), Lightweight Technology on Aircrafts (Mesh Reinforced Membrane, Structural Optimization), Buckling and Bifurcation of Structures (Overall Buckling and Local Buckling Characteristics of Membrane Structures, membrane wrinkling). Molecule simulation and trans-scale mechanics (nanoscale wrinkling etc.).

Research prizes / awards:

- The program of excellent talents. (2013)
- The second prize in national defense technology and invention. (2013)
- The cultivation plan of outstanding talents class III (2012)
- The third prize in scientific and technological progress in military. (2012)
- The program of Ministry of education supporting excellent in new century. (2011)
- Nomination award of top 100 outstanding doctoral dissertations in China. (2009)
- The second prize in progress of science and technology in army of General Armament Department. (2009)

Selected Publications:

- C. G. Wang, L. Lan, Y. P. Liu, H. F. Tan. Vibration characteristics of wrinkled single-layered graphene sheets. *Int. J. Solids Struct.*, 2013, 50(10):1812-1823.
- C. G. Wang, X. W. Du, H. F. Tan, X. D. He, A New Computational Method for Wrinkling Analysis of Gossamer Space Structures, *Int. J. Solids Struct.*, 2009, 46(6):1516-1526.
- C. G. Wang, H. F. Tan, X. W. Du and Z. M. Wan. Wrinkling Prediction of Rectangular Shell-Membrane under Transverse In-Plane Displacement. *Int. J. Solids Struct.*, 2007, 44(20):6507-6516.
- C. G. Wang, L. Lan, H. F. Tan. Secondary Wrinkling Analysis of Rectangular Membrane under Shearing. *Int. J. Mech. Sci.*, 2013, 75:299-304.
- C. G. Wang, X. W. Du and Z. M. Wan. An Experimental Study on Wrinkling Behaviours and Characteristics of Gossamer Space Structures. *Strain*, 2007, 43(4):332-339.
- C. G. Wang, Z. Y. Du and H. F. Tan. Initial wrinkling and its evolution of membrane inflated cone in bending. *Thin wall. struct.*, 2012, 59:97-102.
- C. G. Wang, H. F. Tan and X. D. He. Wrinkle-Crease Interaction Behavior Simulation of A Rectangular Membrane under Shearing. *Acta Mech. Sinica.*, 2011, 27(4): 550-558.
- C. G. Wang, H. F. Tan and X. W. Du. Pseudo-Beam Method for Compressive Buckling Characteristics Analysis of Space Inflatable Load-Carrying Structures. *Acta Mech. Sinica.*, 2009, 25(5):659-668.
- C. G. Wang, H. F. Tan, X. W. Du and X. D. He. A New Model for Wrinkling and Collapse Analysis of Membrane Inflated Beam. *Acta Mech. Sinica.*, 2010, 26(4):617-623.
- C. G. Wang, Z. Y. Du, H. F. Tan. An extremum method for bending-wrinkling predictions of inflated conical cantilever beam. *Struct. Eng. Mech.*, 2013, 46(1): 39-51.
- C. G. Wang, L. N. Mao, X. W. Du, X. D. He. Influence Parameter Analysis and Wrinkling Control of Space Membrane Structures, *Mech. Adv. Mater. Struct.*, 2010, 17(1):49-59.
- C. G. Wang, H. F. Tan and X. W. Du. Wrinkling Behaviors of Gossamer Structure with Stretched Annulus-Shape under In-Plane Torsion. *Mech. Adv. Mater. Struct.*, 2008, 15(2):157-164.
- L. Lan, C. G. Wang, H. F. Tan. Experiment and evaluation of wrinkling strain in a corner tensioned square membrane. *Acta Mech. Sinica.*, doi:10.1007/s10409-013-0099-x , in press.
- C. G. Wang, Y. P. Liu, L. Lan, H. F. Tan. Graphene wrinkling: formation, evolution and collapse. *Nanoscale*, 2013, 5:4454-4461.
- C. G. Wang, L. Lan, H. F. Tan. The physis of wrinkling in graphene membrane under local tension. *Phys. Chem. Chem. Phys.*, 2013, 15(8):2764-2773.
- C. G. Wang and H. F. Tan. Experiment and numerical studies on wrinkling control of inflated beam using SMA wires. *Smart Mater. Struct.*, 2010, 19(10): 105019(9pages).
- C. G. Wang, L. Lan, Y. P. Liu, H. F. Tan. Functional group-guided variable frequency characteristics of graphene resonator. *RSC Adv.*, 2013, 3(36):16095-16101.
- C. G. Wang, Y. P. Liu, L. Li, L. Lan, and H. F. Tan. Abnormal Frequency Characteristics of Wrinkled Graphene. *RSC Adv.*, 2014, 4:9395-9400.
- C. G. Wang, L. Lan; Y. P. Liu; H. F. Tan, Defect-guided wrinkling in graphene. *Comp. Mater. Sci.*, 2013, 77:250-253.
- C. G. Wang, L. Lan, Y. P. Liu and H. F. Tan. Multiple component correlation model for elastic modulus of single layer graphene sheets. *Physica E*. 2014, 56:372-376.
- Y. X. Liu, Y. Y. Liu, H. F. Tan, C. G. Wang, H. G. Wei and Z. H. Guo. Structural evolution and degradation mechanism of Vectran® fiber upon exposure to UV-radiation. *Polym. Degrad. Stabil.*, 2013, 98(9):1744-1753.

C. G. Wang, J. Xie, H. F. Tan. The Modal Analysis and Modal Behavior Investigations on the Wrinkled Membrane Inflated Beam. ACTA Astronaut., 2012, 81:660-666.

C. G. Wang, J. Xie and H. F. Tan. Vibration simulation of wrinkled membrane inflated arch. J. Aerospace Eng., DOI: 10.1061/(ASCE)AS.1943-5525.0000260.

C. G. Wang, H. F. Tan, X. W. Du. Wrinkling Analysis Method Based on Singular Displacement Component Modification for Membrane Structure. J. Spacecraft Rockets., 2010, 47(1):210-213.

C. G. Wang, X. W. Du and L. M. Zhang. Evaluation of Characteristic and Degree of Wrinkles in Space Membrane Structures. J. Spacecraft Rockets., 2007, 44(1):284-286.

C. G. Wang, Y. L. Li, X. W. Du and X. D. He. Simulation Analysis of the Vibration Characteristics of Wrinkled Membrane Space Structure. Int. J. Space Struct., 2007, 22(4):239-246.

C. G. Wang, X. W. Du and Z. M. Wan. Numerical Simulation of Wrinkles in Space Inflatable Structures. J. Spacecraft Rockets., 2006, 43(5):1146-1149.

Selected Patent List:

C. G. Wang, H.F.Tan, X.W.Du. Method to Eliminate Singularity of Stiffness Matrix by Correcting Singular Displacement Components. Patent Number: ZL201010235077.9.

C. G. Wang, X.W.Du, H.F.Tan. Offset parabolic antenna supported by inflatable radial rib. Patent Number: ZL200810064518.6.

C. G. Wang, L.Zhang, Y.P.Liu, L.Lan, H.F.Tan. A clamp for ultra-thin membrane under tension test Offset. Patent Number: ZL20101018102.X.

C. G. Wang, L.Zhang, Y.P.Liu, L.Lan, H.F.Tan. A method using pretension mesh to control configuration of inflatable structures. Patent Number: ZL201210220314.3.

C. G. Wang, T.Zhou, Y.P.Liu, Z.M.Xia, P.Gong, H.F.Tan. An equipment to fold/unfold inflatable chamber. Patent Number: ZL201210479077.2.

C. G. Wang, Y.J.Cui, L.Zhang, Y.P.Liu, H.F.Tan. Design method for precision inflatable structures. Patent Number: ZL201210257425.1.

H.F.Tan, C. G. Wang, Z.Y.Du. Conformal balloon flying on high-altitude. Patent Number: ZL200810137344.1.

H.F.Tan, C. G. Wang, C.Wang. Deployable airship with inflatable skeleton. Patent Number: ZL201010208004.0