CURRICULUM VITAE

KWEK-TZE TAN

Purdue University
Room 3336, Neil Armstrong Hall of Engineering
701 West Stadium Ave, West Lafayette, IN 47907
Phone: 765-494-6237 Fax: 765-494-0307
Email: kttan@purdue.edu

EDUCATION

Purdue University, West Lafayette, IN October 2011 – Current
Post-Doctoral Research Training
School of Aeronautics and Astronautics

- Research Area: Acoustic Composite Metamaterials with Negative Effective Mass Density and Negative Effective Modulus
- Advisor: Professor C.T. Sun

Tokyo Metropolitan University, Tokyo, Japan October 2008 – September 2011
Doctorate of Philosophy
Department of Aerospace Engineering

- Dissertation: Characterization of Impact Damage Tolerance and Performance of Stitched CFRP Laminate
- Advisors: Professor N. Watanabe (TMU) and Director Dr. Y. Iwahori (JAXA)

National University of Singapore, Singapore August 2004 – January 2006
Master of Engineering
Department of Mechanical Engineering

- Thesis: Low-Velocity Impact Damage of Composites by the Element-Failure Method and Strain Invariant Failure Theory
- Advisors: Professor T.E. Tay and Professor Vincent Tan

National University of Singapore, Singapore August 2000 – May 2004
Bachelor of Engineering (Honors)
Department of Mechanical Engineering

RESEARCH INTERESTS

Aerospace Materials and Structures, Composite Materials and Structures, Acoustic/Elastic Metamaterials, Fracture Mechanics, Impact Mechanics, Damage/Delamination of Advanced Composites, Wave Propagation.

TEACHING INTERESTS

Aeromechanics, Aerospace Structural Analysis, Matrix Methods of Aerospace Structures, Design of Aerospace Structures, Aerospace Structural Dynamics and Stability, Experimental Stress Analysis, Nondestructive Evaluation of Structures and Materials, Elasticity in Aerospace Engineering, Fatigue of Structures and Materials, Mechanics of Composite Materials, Fracture Mechanics.

RESEARCH EXPERIENCE

Post-Doctoral Research Associate October 2011 – Current
Purdue University
School of Aeronautics and Astronautics

- Conducted research in the area of acoustic/elastic/mechanical metamaterials with Prof C.T. Sun.
- Developed **a novel dual-resonator microstructure** in acoustic metamaterials to optimize effective mass negativity.
- Investigated the interactive mechanisms of internal resonators in acoustic metamaterials.
- Validated performance using theoretical analysis and numerical simulation.
- Demonstrated potential in industrial applications (defense and aerospace application).
- Published results in ***Applied Physics Letters***.
- Research work is funded by Agency for Science, Technology and Research (A*STAR), Singapore.
- The work is also part of project funded by Defense Advanced Research Projects Agency (DARPA), US Air Force Office of Scientific Research (AFOSR) and US Office of Naval Research (ONR).

Graduate Research Assistant October 2008 – September 2011
Japan Aerospace Exploration Agency (JAXA)
Advanced Composite Research Centre

- Conducted research in the area of advanced composite materials.
- Characterized impact damage tolerance and performance of stitched composites.
- Developed a novel experimental technique to investigate the fracture behavior of a single stitch fiber.
- Implemented a novel computational stitch failure model to predict fracture toughness of stitched composites.
- Clarified the fracture mechanisms and impact damage phenomenon of stitched composites using non-destructive inspection techniques.
- Discovered the empirical ***Delamination Reduction Trend*** for stitched composites.
- Predicted compression-after impact strength of stitched composites using finite element simulation.
- Demonstrated potential of stitching in enhancing impact damage tolerance of aeronautical structures.
- Published results in ***Composites Science & Technology*** (2 papers), ***Composites Part A*** (2 papers) and other composite journals.
- Received **Best Poster Award** at the ***6th International Conference on Fracture of Polymers, Composites and Adhesives***, Les Diablerets, Switzerland, 2011.
- Research work was funded by Tokyo Metropolitan Government in support of the development of Mitsubishi Regional Jet (MRJ) by Mitsubishi Heavy Industries (MHI).

Graduate Research Assistant August 2004 – December 2005
National University of Singapore (NUS)
Department of Mechanical Engineering

- Conducted research in the area of composite materials.
- Implemented a novel element failure method to predict the complex and **multi-scale failure mechanisms** of composite structures under low-velocity impact damage.
- Developed successful impact algorithms and validated well with experimental data.
- Demonstrated potential in predicting impact damage in composite planes (B787).
- Research work was funded and collaborated with the Boeing Company USA.

TEACHING EXPERIENCE

Guest Lecturer January 2012 – Current
Purdue University
School of Aeronautics and Astronautics

- Conducted lecture class for Graduate students in **Mechanics of Composite Materials** (AAE555).
- Prepared lecture notes for students and discussed research area like impact damage of composites.

Graduate Student Advisor October 2008 – September 2011
Tokyo Metropolitan University
Department of Aerospace Engineering

- Helped and advised undergraduate and graduate students in their research work.
- Tutored students on English technical writing, conference presentations and poster designs.

Graduate Teaching Assistant August 2004 – November 2005
National University of Singapore
Department of Mechanical Engineering

- Conducted tutorials for Undergraduate students in **Statics and Mechanics of Materials** (EG1109).
- Developed tutorial sheets and graded assignments.
- Evaluated and assessed students' quizzes and assignments.
- Provided consultation and guidance to students regarding online e-tutorials.
- Received excellent feedback of more than 4.5/5.0 in overall Teaching Effectiveness (based on Teacher Assessment Records).

INDUSTRIAL EXPERIENCE

Mechanical Engineer January 2007 – September 2008
Keppel FELS Limited
Engineering Department Mechanical Section

- Designed mechanical, HVAC and drilling systems for oil rigs (Jack-Ups and Semi Submersibles).
- Discussed technical requirements and engineering designs with rig-owners and equipment vendors.

Mechanical Superintendent January 2006 – January 2007
Keppel FELS Limited
Production Department Mechanical Section

- Planned, managed and supervised oil rigs construction.
- Led a production team of technicians and subcontractors.
- Commissioned and tested equipment involved in mechanical, HVAC and drilling systems of oil rigs (Jack-Ups and Semi Submersibles).

PEER REVIEWED JOURNAL PUBLICATIONS

1. K.T. Tan, A. Yoshimura, N. Watanabe, Y. Iwahori and T. Ishikawa (2013). Effect of Stitch Density and Stitch Thread Thickness on Damage Progression and Failure Characteristics of Stitched Composites under Out-Of-Plane Loading, ***Composites Science and Technology***, 74: 194-204.
2. K.T. Tan, H.H. Huang and C.T. Sun (2012). Optimizing the Band Gap of Effective Mass Negativity in Acoustic Metamaterials, ***Applied Physics Letters***, 101: 241902.
3. K.T. Tan, N. Watanabe, Y. Iwahori and T. Ishikawa (2012). Understanding Effectiveness of Stitching in Suppression of Impact Damage: An Empirical Delamination Reduction Trend for Stitched Composites, ***Composites Part A: Applied Science and Manufacturing***, 43: 823-832.
4. K.T. Tan, N. Watanabe, Y. Iwahori and T. Ishikawa (2012). Effect of Stitch Density and Stitch Thread Thickness on Compression After Impact Strength and Response of Stitched Composites, ***Composites Science and Technology***, 72: 587-598.
5. K.T. Tan, N. Watanabe and Y. Iwahori (2012). Impact Damage Resistance, Response and Mechanisms of Laminated Composites Reinforced by Through-Thickness Stitching, ***International Journal of Damage Mechanics***, 21(1):51-80.
6. K.T. Tan, N. Watanabe and Y. Iwahori (2011). X-ray Radiography and micro Computed Tomography Examination of Damage Characteristics in Stitched Composites subjected to Impact Loading, ***Composites Part B: Engineering***, 42: 874-884.
7. K.T. Tan, N. Watanabe and Y. Iwahori (2011). Stitch Fibre Comparison for Improvement of Interlaminar Fracture Toughness in Stitched Composites, ***Journal of Reinforced Plastics and Composites***, 30(2): 99-109.
8. K.T. Tan, N. Watanabe, Y. Iwahori, H. Hoshi and M. Sano (2010). Interlaminar Fracture Toughness of Vectran-Stitched Composites - Experimental and Computational Analysis, ***Journal of Composite Materials***, 44(26): 3203-3229.
9. K.T. Tan, N. Watanabe and Y. Iwahori (2010). Effect of Stitch Density and Stitch Thread Thickness on Low-Velocity Impact Damage of Stitched Composites, ***Composites Part A: Applied Science and Manufacturing***, 41: 1857-1868.
10. K.T. Tan, N. Watanabe and Y. Iwahori (2010). Experimental Investigation of Bridging Law for Single Stitch Fibre using Interlaminar Tension Test, ***Composite Structures***, 92: 1399-1409.

PEER REVIEWED CONFERENCE PUBLICATIONS

1. K.T. Tan, H.H. Huang and C.T. Sun (2012). Blast-Wave Impact Resistance of Acoustic Metamaterials, Conference Proceeding for **ASME 2012 International Mechanical Engineering Congress & Exposition**, 9-15 Nov, Houston, Texas, USA.
2. H.H. Huang, K.T. Tan and C.T. Sun (2012). Unusual Two-Dimensional Wave Motion in an Orthotropic Elastic Metamaterials, Conference Proceeding for **ASME 2012 International Mechanical Engineering Congress & Exposition**, 9-15 Nov, Houston, Texas, USA.
3. K.T. Tan, A. Yoshimura, N. Watanabe and Y. Iwahori (2012). Impact Damage Progression of Stitched Composites: From Indentation to Penetration, Conference Proceeding for **15th US-Japan Conference on Composite Materials/American Society for Composites 27th Technical Conference**, 1-3 Oct, Arlington, Texas, USA.
4. K.T. Tan, H.H. Huang and C.T. Sun (2012). Negative Effective Mass Density of Acoustic Metamaterial using Dual-Resonator Spring-Mass Model, Conference Proceeding for **Metamaterials 2012**, 17-20 Sept, St. Petersburg, Russia.
5. K.T. Tan, N. Watanabe, A. Yoshimura and Y. Iwahori (2012). Validation of Delamination Reduction Trend for Stitched Composites using Quasi-Static Indentation Test, Conference Proceeding for **15th European Conference on Composite Materials**, ECCM-15, 24-28 Jun, Venice, Italy.
6. K.T. Tan, N. Watanabe, and Y. Iwahori (2011). Fracture Behaviour and Damage Characteristics of Stitched Composites under Impact and Post Impact Loading, Conference Proceeding for **6th**

International Conference on Fracture of Polymers, Composites and Adhesives, 11-15 Sept, Les Diablerets, Switzerland. (***Best Poster Award***)

7. K.T. Tan, N. Watanabe, A. Yoshimura, Y. Iwahori and T. Ishikawa (2011). Progressive Damage in Stitched Composites under Impact Loading, Conference Proceeding for **18th International Conference on Composite Materials**, ICCM-18, 21-26 Aug, Jeju Island, Korea. (***Invited Paper***)
8. K.T. Tan, N. Watanabe, H. Hoshi, A. Yoshimura, Y. Iwahori and T. Ishikawa (2011). Damage Observation of Stitched Composites under Quasi-Static Indentation Loading, Conference Proceeding for **53rd Japan Structural Conference**, 27-29 Jul, Akita, Japan.
9. K.T. Tan, N. Watanabe, Y. Iwahori and T. Ishikawa (2011). Influence of Stitch Density and Stitch Thread Thickness on Compression After Impact Strength of Stitched Composites, Conference Proceeding for **16th International Conference on Composite Structures**, ICCS-16, 28-30 Jun, Porto, Portugal.
10. K.T. Tan, N. Watanabe, H. Hoshi, Y. Iwahori and T. Ishikawa (2011). Enhancement of Compression After Impact Strength Using Through-Thickness Stitching, Conference Proceeding for **2nd Japan Conference on Composite Materials**, JCCM-2, 16-18 Mar, Tokyo, Japan.
11. K.T. Tan, N. Watanabe, H. Hoshi, Y. Iwahori and T. Ishikawa (2010). Compression After Impact Performance of Vectran-Stitched Composites, Conference Proceeding for **7th Asian-Australasian Conference on Composite Materials**, ACCM-7, 15-18 Nov, Taipei, Taiwan.
12. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2010). Prediction of Delamination Damage in Stitched Composites Due to Impact Loading, Conference Proceeding for **35th Composite Materials Symposium**, 13-14 Oct, Hiroshima, Japan (***in Japanese***).
13. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2010). Impact-Induced Delamination Suppression in Laminated Composites using Through-Thickness Stitching, Conference Proceeding for **14th US-Japan Conference on Composite Materials/American Society for Composites 25th Technical Conference**, 20-23 Sept, Dayton, Ohio, USA.
14. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2010). Effectiveness of Stitching in Damage Tolerance of Laminated Composites, Conference Proceeding for **9th China-Japan Joint Conference on Composite Materials**, CJJCC-9, 6-9 Sept, Hohhot, Inner Mongolia, China.
15. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2010). Damage Response and Mechanisms of Stitched Composites Under Impact Loading, Conference Proceeding for **14th European Conference on Composite Materials**, ECCM-14, 7-10 Jun, Budapest, Hungary.
16. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2010). Influence of Stitch Density and Stitch Thread Thickness on Low Velocity Impact Response of Vectran-Stitched Composites, Conference Proceeding for **1st Japan Conference on Composite Materials**, JCCM-1, 9-11 Mar, Kyoto, Japan.
17. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2009). Application of Vectran-Stitched Composites in Aircraft Structures, Conference Proceeding for **2nd International Seminar on System Design**, ISSD2009, 4-6 Nov, Tokyo, Japan.
18. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2009). Low Velocity Impact Damage Response of Vectran-Stitched Composites, Conference Proceeding for **7th Japan-Korea Joint Symposium on Composite Materials**, 24-26 Sept, Kanazawa, Japan.
19. K.T. Tan, N. Watanabe, M. Sano, M. Takase, Y. Iwahori and H. Hoshi (2009). Material Selection of Z-fibre in Stitched Composites - Experimental and Analytical Comparison Approach, Conference Proceeding for **17th International Conference on Composite Materials**, ICCM-17, 27-31 Jul, Edinburgh, Scotland.
20. K.T. Tan and N. Watanabe (2009). Computational Modeling of Mode I Fracture Toughness in Vectran-Stitched Composites, Conference Proceeding for **JSCM Spring Conference**, 18-19 May, Tokyo, Japan.

INVITED TALKS / PRESENTATIONS

1. K.T. Tan (2010). Research on Interlaminar Reinforcement of Stitched Composites, Presentation by International Students of Asia on Advanced Research (**Tokyo Asian Month**), 8 Nov, Tokyo, Japan (*in Japanese*).
2. K.T. Tan, N. Watanabe, H. Hoshi and Y. Iwahori (2010). Interlaminar Fracture Toughness of Vectran-Stitched Laminate, **Nippon Steel Corporation**, 21 May, Tokyo, Japan.

HONORS & AWARDS

1. **ICA Young Scientist Grant (**from **International Commission for Acoustics)** 2013
   - Award to attend and present at 21st International Congress on Acoustics, Montreal, Canada.
2. **Travel Grant Award for Young Researchers (**from **Metamaterials Congress)** 2012
   - Award to attend and present at conference Metamaterials 2012, St. Petersburg, Russia.
3. **A*STAR International Fellowship** 2011
   - Post-Doctoral Fellowship from Agency for Science, Technology and Research, Singapore.
4. **Best Poster Award** (from **ESIS**, European Structural Integrity Society) 2011
   - ***6th International Conference on Fracture of Polymers, Composites and Adhesives***, Les Diablerets, Switzerland, 11-15 Sept 2011.
   - Paper Title: KT Tan, N Watanabe and Y Iwahori, "Fracture behavior and damage characteristics of stitched composites under impact and post impact loading".
5. **TMU Graduate Student Conference Travel Grant** 2009
   - Award to attend and present at 17th International Conference on Composite Materials (ICCM-17), Edinburgh, Scotland.
6. **Tokyo Metropolitan Government Scholarship (Ph.D.)** 2008
   - Full Scholarship for Doctoral Program in Tokyo Metropolitan University.
   - Joint Research Collaboration with Japan Aerospace Exploration Agency (JAXA).
7. **NUS Research Scholarship (M. Eng.)** 2004
   - Scholarship for Masters Program in National University of Singapore.
8. **Keppel Group Scholarship (B. Eng.)** 2000
   - Scholarship for Undergraduate Program in National University of Singapore.
9. **Hwa Chong Junior College Individual Colors Award** 1997
   - Award for outstanding student in both academic and extra-curricular activities.
10. **American Mathematics Competition** (Certificate of Distinction) 1997
11. **University of New South Wales Science Competition** (Certificate of Distinction) 1997
12. **BP Technology Challenge** (Champion Team) 1994
    - Award for the winning team in Singapore National Science Competition.
    - Represented Singapore to participate in London International Youth Science Forum (LIYSF), July 1995, London, UK.
13. **Australian Mathematics Competition** (Certificate of Distinction) 1994

PROFESSIONAL ORGANIZATIONS

1.	The American Institute of Aeronautics and Astronautics (AIAA)	2012–Present
2.	American Society of Mechanical Engineers (ASME)	2012–Present
3.	Acoustical Society of America (ASA)	2012–Present
4.	American Society of Composites (ASC)	2010–Present
5.	European Society for Composite Materials (ESCM)	2010–Present
6.	Japan Society for Composite Materials (JSCM)	2008–Present
7.	The Japan Society for Aeronautical and Space Sciences (JSASS)	2008–Present
8.	Asian Human Network Databank	2008–Present

PROFESSIONAL SERVICES

Reviewer for the following International Journals:

1. *Composites Science and Technology*
2. *Composites Part A: Applied Science and Manufacturing*
3. *Composites Part B: Engineering*
4. *Journal of Composite Materials*
5. *Journal of Reinforced Plastics and Composites*
6. *International Journal of Composite Materials*
7. *Open Journal of Composite Materials*
8. *International Journal of Damage Mechanics*
9. *Meccanica* (An International Journal of Theoretical and Applied Mechanics)
10. *Inverse Problems in Science & Engineering*
11. *Experimental Techniques*
12. *Journal of Materials Science Research*
13. *International Journal of Material Science*
14. *American Journal of Materials Engineering and Technology*
15. *Open Journal of Inorganic Non-metallic Materials*

Editorial Board in the following International Journals:

1. *Journal of Materials Science Research*
2. *American Journal of Materials Engineering and Technology*

Reviewer for the Thomson Reuters **Academic Reputation Survey - Times Higher Education World University Rankings 2012**.

PROFESSIONAL DEVELOPMENT

College Teaching Workshop- Series II: Best Practices, Tools & Resources for Teaching ESL Students January 2013– Current

Center for Instructional Excellence, Purdue University

Participated a series of advanced college teaching workshops focused on bringing together the best practices, scholarship of teaching and learning, and resources to **address the growing internationalization of Purdue**, and help all students address global needs and challenges across all disciplines.

Improving Research Communication with Improv October-November 2012
The Graduate School, Purdue University
This series of six workshops, by Dr. Linda Mason, uses Improv techniques from theater to improve both oral and written research communication skills. This allows researchers to find greater clarity in presenting their subject matter, which thus enables them to directly and dynamically connect with their audience.

Grant Writing Workshops October 2012
The Graduate School, Purdue University
Workshops by Sally Bond (Lead Proposal Coordinator in the Office of the Vice President for Research) and Amanda Hamaker (Assistant Director in the Pre-Award Sponsored Program Services) on successful grant writing strategies and the art of crafting budget for a grant proposal.

Preparing Future Faculty January-May 2012
The Graduate School, Purdue University
Explored faculty roles, responsibilities and development opportunities at different higher education institutions. Mentoring experience with top administrators including the provost, vice-president for research, vice-provosts, deans, department heads, and faculty members.

College Teaching Workshop- Series I: Building on the Basics January-May 2012
Center for Instructional Excellence, Purdue University
Participated and successfully completed a series of college teaching workshops focused on improving teaching skills to enhance student learning, including topics such as student-teacher relationships, designing a course from scratch, creating the engaged classroom, getting feedback to improve your teaching, tools and techniques for creating effective tests, etc.

College Teaching Workshop- Series II: Expanding Your Teaching Toolkit January-May 2012
Center for Instructional Excellence, Purdue University
Participated and successfully completed a series of advanced college teaching workshops focused on improving teaching skills to enhance student learning, including topics such as the scholarship of teaching and learning, how can we get our students to write, techniques for giving a great seminar, demystifying the new core curriculum, etc.

Grant and Proposal Writing Strategies February 2012
The Graduate School, Purdue University
Workshop by Dr. Peter Dunn (Associate Vice Provost of Research, Director of University Research Administration & Compliance) providing tips, advice and instruction on how to write a proposal for funding.