

Chew Huck Beng

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Division of Engineering
Brown University
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Education

National University of Singapore

Doctor of Philosophy, Mechanical Engineering, 2007

National University of Singapore

Master of Engineering, *Accelerated Masters Program*, 2003

National University of Singapore

Bachelor of Engineering (1st Class Honors), *University Scholar Program*, 2002

Research Experience

Brown University, Providence, RI

Postdoctoral Research Associate, Division of Engineering, 2008 – Present

Research highlights include the discovery of a new “atom shooting fracture” nano-mechanism by which carbon nanotubes are cut during ultrasonication; molecular dynamics analysis of nanopore formation in diamond-like carbon by irradiation as possible hydrogen storage medium; and a field projection methodology for the extraction of cohesive-zone laws for void growth in porous media.

Advisor: Prof Kyung-Suk Kim

National University of Singapore

Graduate Research Assistant, Department of Mechanical Engineering, 2003 – 2007

Dissertation: “A mechanism-based approach – void growth and coalescence in polymeric adhesive joints”

Research involves developing micromechanics models to describe the mechanisms of thermal and vapor pressure-induced micro-scale void growth and coalescence in thin film adhesives, and the implementation of these models as predictive tools for failure of complex multilayered structures.

Advisor: Assoc. Prof Cheng Li

Teaching Experience

Brown University, Providence, RI

Course Instructor, Division of Engineering, 2009

Developed and delivered lectures, review sessions, and examinations for undergraduate course EN130: Structural Analysis and Design

National University of Singapore

Teaching Assistant, Department of Mechanical Engineering, 2005

Responsible for the recitation section for undergraduate course ME4104: Fracture Mechanics

Lab Assistant, Department of Mechanical Engineering, 2002

Supervised undergraduate laboratory experiments for ME2111: Mechanics of Materials

Awards, Fellowships and Affiliations

Institution of Mechanical Engineers

Chartered Engineer CEng MIMechE

National University of Singapore

President Graduate Fellowship

Vice Chancellor’s List

Dean’s List 2001/2002 (Sem 1); 1999/2000 (Sem 1); 1998/1999 (Sem 2) & 1998/1999 (Sem 1)

ISTP-9 Fluid and Thermo Book Prize, 1999-2000

Faculty of Engineering Book Prize, Top student in academic year, 1998-1999

International Refereed Journal Articles

- [1] **Chew, H.B.**, Hong, S. and Kim, K.-S., Cohesive zone laws for void growth – II. Numerical field projection of elasto-plastic fracture processes with vapor pressure. Journal of the Mechanics and Physics of Solids, 57 (2009), 1374-1390.
- [2] Hong, S., **Chew, H.B.** and Kim, K.-S., Cohesive zone laws for void growth – I. Experimental field projection of crack-tip crazing in glassy polymers. Journal of the Mechanics and Physics of Solids, 57 (2009), 1357-1373.
- [3] Cheong, W.G., **Chew, H.B.**, Guo, T.F. and Cheng, L., Thermo-mechanical analysis of Plastic Ball Grid Arrays with vapor pressure effects. IEEE Transactions on Components and Packaging Technologies, 32 (2009), 12-19.
- [4] **Chew, H.B.**, Guo, T.F. and Cheng, L., Influence of nonuniform initial porosity distribution on adhesive failure in electronic packages. IEEE Transactions on Components and Packaging Technologies, 31 (2008), 277-284.
- [5] **Chew, H.B.**, Guo, T.F. and Cheng, L., Pressure-sensitive ductile layers — II. 3D models of extensive damage. International Journal of Solids and Structures, 44 (2007), 5349-5368.
- [6] **Chew, H.B.**, Guo, T.F. and Cheng, L., Pressure-sensitive ductile layers — I. Modeling the growth of extensive damage. International Journal of Solids and Structures, 44 (2007), 2553-2570.
- [7] **Chew, H.B.**, Guo, T.F. and Cheng, L., Effects of pressure-sensitivity and plastic dilatancy on void growth and interaction. International Journal of Solids and Structures, 43 (2006), 6380-6397.
- [8] **Chew, H.B.**, Guo, T.F. and Cheng, L., Vapor pressure and voiding effects on thin film damage. Thin Solid Films, 504 (2006), 325-330.
- [9] **Chew, H.B.**, Guo, T.F. and Cheng, L., Vapor pressure and residual stress effects on mixed mode toughness of an adhesive film. International Journal of Fracture, 134 (2005), 349-368.
- [10] **Chew, H.B.**, Guo, T.F. and Cheng, L., Vapor pressure and residual stress effects on the failure of an adhesive film. International Journal of Solids and Structures, 42 (2005), 4795-4810.
- [11] **Chew, H.B.**, Guo, T.F. and Cheng, L., Vapor pressure and residual stress effects on the toughness of polymeric adhesive joints. Engineering Fracture Mechanics, 71 (2004), 2435-2448.

Book Chapters

- [12] **Chew, H.B.**, Guo, T.F. and Cheng, L., Mechanism-based modeling of thermal and moisture induced failure of IC devices, in: Moisture Sensitivity of Plastic Packages of IC Devices, Chapter 12. Editors: Fan, X.J. and Suhir, E. Springer 2009.

Conference Papers

- [13] **Chew, H.B.** and Kim, K.-S., Dynamic fragmentation of single-wall carbon nanotubes induced by sonication, *12th International Conference on Fracture*, 12-17 July 2009, Ottawa, Canada.
- [14] Xia, S., **Chew, H.B.**, Hong S. and Kim, K.-S., Micromechanics of multi-scale cohesive zone models, *ASME International Mechanical Engineering Congress and Exposition*, 31 Oct – 6 Nov 2008, Boston, MA.
- [15] **Chew, H.B.** and Kim, K.-S., An inverse method of establishing traction-separation relations for void growth, *Society of Engineering Science*, 13-15 Oct 2008, Champaign, IL.
- [16] **Chew, H.B.**, Guo, T.F. and Cheng, L., Modeling adhesive failure in electronic packages. *Proceedings of 8th Electronics Packaging Technology Conference (ISBN 1-4244-0664-1)*, 6-8 Dec 2006, Singapore, Vol. 2, pp. 787-792.
- [17] **Chew, H.B.**, Guo, T.F. and Cheng, L., Void growth and damage ahead of a crack in pressure-sensitive dilatant polymers. *Proceedings of International Conference on High Performance Structures and Materials (ISSN 1743-3509)*, 3-5 May 2006, Ostend, Belgium, Vol. 85, pp. 501-510.

- [18] **Chew, H.B.**, Guo, T.F. and Cheng, L., Influence of non-uniform initial porosity distribution on adhesive failure in electronic packages. *Proceedings of 7th Electronics Packaging Technology Conference (IEEE Cat. No. 05EX1233C)*, 7-9 Dec 2005, Singapore, pp. 6-11.
- [19] **Chew, H.B.**, Guo, T.F. and Cheng, L., Vapor pressure and voiding effects on thin film damage. *Presented in International Conference on Materials for Advanced Technologies*, 3-8 July 2005, Singapore.
- [20] **Chew, H.B.**, Guo, T.F. and Cheng, L., Computational study of compressive failure of metallic foam. *Proceedings of International Conference on Computational Methods*, 15-17 Dec 2004, Singapore.
- [21] **Chew, H.B.**, Guo, T.F. and Cheng, L., Computational study of vapor pressure and residual stress effects on adhesive failure. *Proceedings of International Conference on Scientific & Engineering Computation*, 30 June - 02 July 2004, Singapore.
- [22] **Chew, H.B.**, Guo, T.F. and Cheng, L., A mechanism-based approach for interface toughness of ductile layer joining elastic solids. *JSME/ASME Proceedings of International Conference on Materials and Processing*, 15-18 Oct 2002, Hawaii, Vol. 1, pp. 570-575.
- [23] **Chew, H.B.**, Guo, T.F. and Cheng, L., Modeling interface delamination in plastic IC packages. *Proceedings of APACK 2001 Conference on Advances in Packaging*, 5-7 Dec 2001, Singapore, pp. 381- 388.

Work Experience

EFE Engineering Pte Ltd, 2003–2005, 2007

Mechanical/Piping engineer

Performed pipe stress analysis and pressure vessel design for offshore oil and gas and onshore petrochemical industry and refineries