Dr. Richard Butler, Beng, CEng, PnD, MRAeS

See:
http://www.bath.ac.uk/mech-eng/people/butler/
http://www.bath.ac.uk/mech-eng/research/composites/
http://www.bath.ac.uk/cnm/people.html
http://www.researchgate.net/researcher/71580360_Richard_Butler

Reader in Aircraft Structures
Department of Mechanical Engineering
University of Bath

Profile:
Dr Butler obtained his BEng and PhD from the University of Wales, Cardiff. He was appointed as Lecturer in Aerospace Structures at Bath in 1990. Since then he has worked closely with aerospace manufacturers to understand and improve the structural performance of advanced wing structures and helicopter rotor blades. In order to create closer links with industry, he has recently undertaken a Royal Academy of Engineering secondment to the Composites Technology Centre in GKN Aerospace.

Research Interests:

Structural optimisation
Composite structures
Buckling and vibration
Aeroelasticity
Damage detection
Compressive strength of delaminated composites.

Dr Butler's research interests are currently focused on the damage tolerance and elastic tailoring of composite structures. In particular, he has developed novel analytical methods for predicting the compressive strength of composite laminates following delamination damage. Such damage could either be sustained in service, or could arise from small manufacturing defects.

Other interests include: the prediction of stability (as a result of buckling) in aerospace structures; the optimum placement of carbon or glass fibres in structures, and the development of novel methods for joining composite and metallic structures. Ongoing projects are exploring the use of future manufacturing capability, such as curved fibre paths and additive layer processes, to further improve structural efficiency.

The Composite Research Unit has a full suite of structural test facilities, along with the ability to use non-linear Finite Element software for verification and validation purposes. The team's optimisation and analysis methods have been used to achieve strength and stiffness improvements of over 20%, leading to significant opportunity for savings in structural weight and fuel-saving potential.

Teaching units:

Solid Mechanics 4
Aerospace Structures I
Aerospace Structures II
Composite Materials.

Publications:

Kinawy, M., Butler, R. and Hunt, G. W., 2010. Buckling and propagation of a delaminated composite beam in bending. In: AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference 2010: Collection of Technical Papers. American Institute of Aeronautics and Astronautics.

Baker, N. and Butler, R., 2010. Compression after impact modeling of damage tolerant composite laminates. In: 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference. Reston, VA.: American Institute of Aeronautics and Astronautics.

Butler, R. and Liu, W., 2008. Optimisation of stiffened panels using finite strip models. In: Falzon, B. G. and Aliabadi, M. H., eds. Buckling and postbuckling structures. London: Imperial College Press.
Articles

Kinawy, M., Butler, R. and Hunt, G. W., 2011. Buckling and postbuckling of a delaminated composite beam in bending. AIAA Journal, 49 (3), pp. 670-672.

Rhead, A. T., Butler, R. and Baker, N., 2011. Analysis and compression testing of laminates optimised for damage tolerance. Applied Composite Materials, 18 (1), pp. 85-100.

Rhead, A. T., Marchant, D. and Butler, R., 2010. Compressive strength of composite laminates following free edge impact. Composites Part A Applied Science and Manufacturing, 41 (9), pp. 1056-1065.

Rhead, A. and Butler, R., 2009. Compressive Static Strength Model for Impact Damaged Laminates. Composites Science and Technology, 69 (14), pp. 2301-2307.

Rhead, A., Butler, R. and Hunt, G. W., 2009. Post-buckled propagation model for compressive fatigue of impact damaged laminates. International Journal of Solids and Structures, 45 (16), pp. 4349-4361.

Liu, W., Butler, R. and Kim, H. A., 2008. Optimization of composite stiffened panels subject to compression and lateral pressure using a bi-level approach. Structural and Multidisciplinary Optimization, 36 (3), pp. 235-245.

Williams, P. A., Butler, R., Kim, H. A. and Hunt, G. W., 2008. Postbuckling of truss-lattice shear panels using exact theory. Journal of Mechanics of Materials and Structures, 3 (5), pp. 995-1009.

Williams, P. A., Kim, H. A. and Butler, R., 2008. Bi-modal buckling of optimised truss-lattice shear panels. AIAA Journal, 46 (8), pp. 1937-1962.

Giddings, P., Bowen, C. R., Butler, R. and Kim, H. A., 2008. Characterisation of actuation properties of piezoelectric bi-stable carbon-fibre laminates. Composites Part A - Applied Science and Manufacturing, 39 (4), pp. 697-703.

Bowen, C. R., Salo, A. I. T., Butler, R., Chang, E. and Kim, H. A., 2007. Bi-stable composites with piezoelectric actuators for shape change. Key Engineering Materials, 334-335 II, pp. 1109-1112.

Butler, R., Almond, D. P., Hunt, G. W., Hu, B. and Gathercole, N., 2007. Compressive fatigue limit of impact damaged composite laminates. Composites Part A - Applied Science and Manufacturing, 38 (4), pp. 1211-1215.

Bowen, C. R., Butler, R., Jervis, R., Kim, H. A. and Salo, A. I. T., 2007. Morphing and shape control using unsymmetrical composites. Journal of Intelligent Material Systems and Structures, 18 (1), pp. 89-98.

Liu, W., Butler, R., Mileham, A. R. and Green, A. J., 2006. Bilevel optimization and postbuckling of highly strained composite stiffened panels. AIAA Journal, 44 (11), pp. 2562-2570.

Hunt, G. W., Hu, B., Butler, R., Almond, D. P. and Wright, J. E., 2004. Nonlinear modeling of delaminated struts. AIAA Journal, 42 (11), pp. 2364-2372.

Lillico, M., Butler, R., Hunt, G. W., Watson, A. and Kennedy, D., 2003. Postbuckling of stiffened panels using strut, strip, and finite element methods. AIAA Journal, 41 (6), pp. 1172-1179.

Lillico, M., Butler, R., Hunt, G. W., Watson, A., Kennedy, D. and Williams, F. W., 2002. Analysis and testing of a postbuckled stiffened panel. AIAA Journal, 40 (5), pp. 996-1000.

Butler, R., Lillico, M., Hunt, G. W. and McDonald, N. J., 2001. Experiments on interactive buckling in optimized stiffened panels. Structural and Multidisciplinary Optimization, 23 (1), pp. 40-48.

Harrison, C. and Butler, R., 2001. Locating delaminations in composite beams using gradient techniques and a genetic algorithm. AIAA Journal, 39 (7), pp. 1383-1389.
Conference or Workshop Items

Rhead, A., Butler, R. and Baker, N., 2009. Compression Testing of Laminates Optimised for Damage Tolerance. In: 17th International Conference on Composite Materials (ICCM-17), 27-31 July 2009, Edinburgh, UK.

Kinawy, M. and Butler, R., 2009. Face Damage Growth of Sandwich Composites under Compressive Fatigue Loading. In: 17th International Conference on Composite Materials (ICCM-17), 27-31 July 2009, Edinburgh, UK.

Butler, R., Baker, N. and Liu, W., 2009. Damage Tolerance of Buckling Optimized Variable Angle Tow Panels. In: 50th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, 4-7 May 2009, Palm Springs, CA, USA. Paper No. AIAA-2009-2443.

Williams, P. A., Kim, H. A. and Butler, R., 2008. Discrete modeling method for post-buckling of shear panels. In: 8th World Congress on Computational Mechanics, 30 June - 4 July 2008, Venice, Italy.

Baker, N., Rhead, A. and Butler, R., 2008. Optimisation of aerospace laminates for damage tolerance. In: 7th ASMO UK/ISSMO Conference on Engineering Design Optimization, 7-8 July 2008, Bath, UK.

Rhead, A. and Butler, R., 2008. A static compressive strength model for damaged composite laminates. In: 13th European Conference on Composite Materials, 2-5 June 2009, Stockholm, Sweden.

Phani, A. S., Butler, R., Habgood, S. and Bowen, C. R., 2008. Analysis of wing morphing via frame buckling. In: 49th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, 7-10 April 2008, Schaumburg, IL, USA. Paper No. AIAA-2008-1792.

Liu, W. and Butler, R., 2008. Buckling optimization for composite panels with elastic tailoring. In: 49th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, 7-10 April 2008, Schaumburg, IL, USA. Paper No. AIAA-2008-2125 .

Williams, P. A., Butler, R., Kim, H. A. and Hunt, G. W., 2007. A comparison of analytical methods for post-buckling of truss-lattice shear panels. In: 48th AIAA SDM, ASC, NDA, GSF and MDO Conference, May 2007, Waikiki, Hawaii.

Liu, W. and Butler, R., 2007. Optimum buckling design of composite wing cover panels with manufacturing constraints. In: 48th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, Apr 2007, Honolulu, Hawaii. AIAA.

Williams, P. A., Butler, R., Kim, H. A. and Hunt, G. W., 2007. Complementary post-buckling analyses of truss-lattice shear panels. In: AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials

Conference, Waikiki, HI, United States. American Institute of Aeronautics and Astronautics Inc., Reston, VA 20191-4344, United States, pp. 5048-5059.

Rhead, A. T., Butler, R. and Hunt, G. W., 2007. Enhanced compressive fatigue model for impact damaged laminates. In: 16th International Conference on Composite Materials: ICCM-16 - "A Giant Step Towards Environmental Awareness: From Green Composites to Aerospace", 8-13 July 2007, Kyoto, Japan.

Bowen, C. R., Salo, A. I. T., Butler, R., Chang, E. and Kim, H. A., 2006. Bi-stable composites with piezoelectric actuators for shape change. In: 5th Asian-Australian Conference on Composite Materials, November 2006, Hong Kong, China.

Liu, W., Butler, R. and Kim, H. A., 2006. Optimum design and non-linear analysis of composite stiffened panels subject to compression and lateral pressure. In: 6th ASMO-UK/ISSMO International Conference on Engineering Design Optimization, July 2006, Oxford, UK.

Kontis, N., Butler, R. and Hunt, G. W., 2006. Post-buckling of stiffened composite structures with delaminations. In: Proceedings of the 47th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference,, May 2006, Newport, Rhode Island, USA, May 2006.

Butler, R., Almond, D. P., Hunt, G. W., Hu, B. and Gathercole, N., 2005. Fatigue limit and post-buckling behaviour of impact damaged composites. In: 8th Deformation and Fracture of Composites Conference, April 2005, Sheffield.

Liu, W., Butler, R. and Mileham, A. R., 2005. Optimum design, experimental testing and post-buckling analysis of thick composite stiffened panels. In: 46th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, Apr 2005, Austin, Texas. AIAA.

Kim, H., Butler, R. and Williams, P. A., 2004. Analysis for buckling optimisation of shear panels. In: 6th World Congress on Computational Mechanics, Sep 2004, Beijing, China.

Kim, H. A., Butler, R. and Williams, P. A., 2004. Buckling and post-buckling analysis of shear panels for optimisation. In: 6th World Congress on Computational Mechanics, Sep 2004, Beijing, China.

Hu, B., Butler, R., Almond, D. P. and Hunt, G. W., 2004. Post-buckling and fatigue limit of artifically delaminated composites. In: Proceedings of the 45th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference,, Apr 2004, Palm Springs, California, USA.

Almond, D. P., Butler, R., Hu, B. and Hunt, G. W., 2003. The effect of delamination damage on the compressive strength and fatigue life of aerospace composites. In: 7th Deformation and Fracture of Composites Conference, April 2003, Sheffield.

Gray, J., Gursul, I. and Butler, R., 2003. Aeroelastic Response of a Flexible Delta Wing Due to Unsteady Vortex Flows. In: 41st Aerospace Sciences Meeting and Exhibit, Jan 2003, Reno, NV.

Butler, R., Kim, H. A. and Pote, P. J., 2003. Optimized buckling of shear panels - from insect to airliner. In: UAV Structures Conference, Jan 2003, Royal Aeronautical Society, London. Royal Aeronautical Society.

Hunt, G. W., Hu, B., Butler, R. and Almond, D. P., 2003. Nonlinear modelling of delaminated struts. In: Proceedings of the 44th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, April 2003, Norfolk, Virginia, USA.

Lillico, M., Butler, R., Hunt, G. W., Watson, A. and Kennedy, D., 2001. Post-buckling of single and multi-bay panels using strut, strip and finite element methods. In: Proceedings of the 42nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference,, Apr 2001, Seattle, Washington, USA, April 2001.