

Fig. 9. Load-shortening curves (numerical and experimental) and deformation patterns (numerical)

Left-hand image above is from: Alexander Kling, Jan Tessmer and Richard Degenhardt, "Validation procedure for nonlinear analysis of stringer stiffened CFRP panels", 25th International Congress of the Aeronautical Sciences (ICAS2006), Hamburg, 3-8 September 2006

Right-hand image above is from: R. Degenhardt, H. Klein, A. Kling, H. Temmen, R. Zimmermann, "Buckling and postbuckling analysis of shells under quasi-static and dynamic loads", undated pdf file; no references; possibly created about 2001.

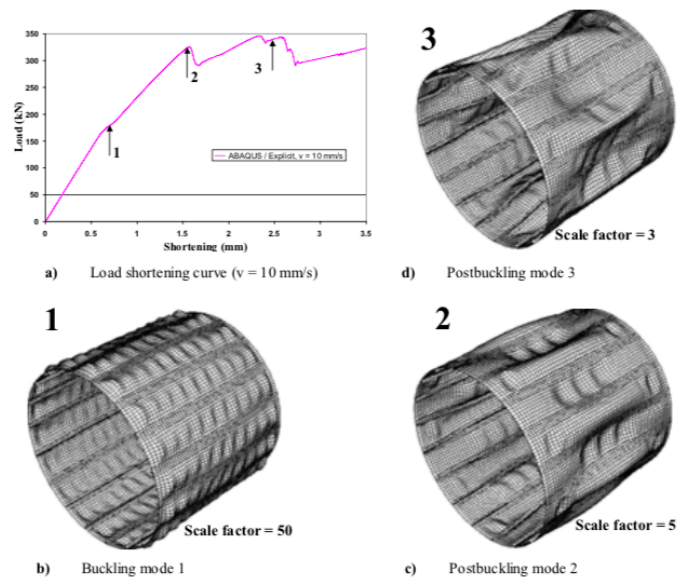


FIGURE 4. Pure axial loading

Dr. Alexander Kling

DLR, Institute of Composite Structures and Adaptive Systems, Braunschweig Germany

Selected Publications:

R. Degenhardt, H. Klein, A. Kling, H. Temmen, R. Zimmermann, "Buckling and postbuckling analysis of shells under quasi-static and dynamic loads", undated pdf file; no publisher, no references; possibly created about 2001.

R. Rolfes, C. Hühne, A. Kling, H. Temmen, B. Geier, H. Klein, J. Tessmer, R. Zimmermann, "Advances in computational stability analysis of thin-walled aerospace structures regarding postbuckling, robust design and dynamic loading", in *Thin-Walled Structures: Advances in Research, Design and Manufacturing ...* edited by J. Loughlan, Fourth International Conference on Thin-Walled Structures, 2004, IOP Publishing Ltd.

A. Kling, R. Degenhardt, and R. Zimmermann, Postbuckling analysis of fibre composite stringer stiffened panels - development of a fast tool design, in *Proceedings of the International Conference on Buckling and Postbuckling Behaviour of Composite Laminated Shell Structures*, Eilat, Israel, March 2004.

Kling A., Degenhardt R., Klein H., Tessmer J., Zimmermann R., "Novel stability design scenario for aircraft structures – simulation and experimental validation", *Proceedings of the 5th International Conference on Computation of Shell and Spatial Structures*, 1-4 June, 2005 Salzburg, Austria

R. Zimmermann, H. Klein, and A. Kling, "Buckling and postbuckling of stringer stiffened fibre composite curved panels: tests and computations", *Compos. Struct.* 73:2 (2006), 150–161.

A. Kling, R. Degenhardt, and R. Zimmerman, "A hybrid subspace analysis procedure for non-linear postbuckling calculation," *Compos. Struct.*, 73, 162–170 (2006).

Alexander Kling, Jan Tessmer and Richard Degenhardt, "Validation procedure for nonlinear analysis of stringer stiffened CFRP panels", 25th International Congress of the Aeronautical Sciences (ICAS2006), Hamburg, 3-8 September 2006

Degenhardt R., Kling A., Rohwer K., "Future Design Scenario for Composite Airframe Panels", *Proceedings of the 25th ICAS Congress*, Hamburg, 3-8 September 2006

Degenhardt R., Kling A., Rohwer K., "Design and analysis of composite panels", III European Conference on Computational Mechanics", Lisbon, 5-8 June, 2006

R. Degenhardt, A. Kling, H. Klein, W. Hillger, H. C. Goetting, R. Zimmermann and K. Rohwer, "Experiments on buckling and postbuckling of thin-walled CFRP structures using advanced measurement systems," International Journal of Structural Stability and Dynamics, vol. 7, no. 2, pp. 337-358, 2007.

R. Degenhardt, A. Bethge, A. Kling, R. Zimmermann, K. Rohwer, H. Klein, J. Tessmer, A. Calvi, Probabilistic approach for improved buckling knock-down factors of CFRP cylindrical shells, 1st CEAS European Air and Space Conference, Berlin 2007, CD ISSN 0700-408, pp. 3091-3100.

R. Degenhardt, A. Bethge, A. Kling, R. Zimmermann and K. Rohwer, Probabilistic approach for better buckling knock-down factors of CFRP cylindrical shells – tests and analyses, in: Proceedings of the 18th Engineering Mechanics Division Conference (EMD2007).

R. Degenhardt, A. Kling, K. Rohwer, A.C. Orifici and R.S. Thomson, Design and analysis of stiffened composite panels including post-buckling and collapse", Computers & Structures, Vol. 86, No. 9, 919-929, May 2008

A. C. Orifici, R. S. Thomson, R. Degenhardt, A. Kling, K. Rohwer and J. Bayandor. Degradation investigation in a postbuckling composite stiffened fuselage panel, Composite Structures, Vol. 82 (2008) pp. 217-224.

R. Degenhardt, A. Kling, A. Bethge, J. Orf, L. Kärger, R. Zimmermann, K. Rohwer and A. Calvi, "Investigations on imperfection sensitivity and deduction of improved knock-down factors for unstiffened CFRP cylindrical shells," Composite Structures, vol. 92, no. 8, pp. 1939-1946, 2010.

R. Degenhardt, R. Zimmermann, A. Kling and D. Wilckens, "New Robust Design Guideline for imperfection sensitive composite launcher structures," in 3rd CEAS Congress, Venice, Italy, 2011.

D. Chrupalla, S. Berg, L. Kärger, M. Doreille, T. Ludwig, E. Jansen, R. Rolfes, A. Kling, "A homogenization-based two-way multiscale approach for composite structures", R. Rolfes, E.L. Jansen (Eds.), Proceedings of the 3rd ECCOMAS thematic conference on the mechanical response of composites, Hannover, Germany (2011), pp. 263-270

B. Kriegesmann, R. Rolfes, C. Hühne and A. Kling, "Fast probabilistic design procedure for axially compressed composite cylinders," Composite Structures, vol. 93, pp. 3140-3149, 2011.

R. Degenhardt, A. Kling, R. Zimmermann and F. Oderman, Dealing with imperfection sensitivity of composite structures prone to buckling, in "Advances in Computational Stability Analysis" ; book edited by Safa Bozkurt Coskun, ISBN 978-953-51-0673-9, 2012.

I. Elishakoff, B. Kriegesmann, R. Rolfes, C. Hühne and A. Kling, "Optimization and antioptimization of buckling load for composite cylindrical shells under uncertainties," AIAA Journal, vol. 50(7), pp. 1513-1524, 2012.

R. Degenhardt, S.G.P. Castro, M.A. Arbelo, R. Zimmerman, R. Khakimova, and A. Kling, Future Structural Stability Design for Composite Space and Airframe Structures, Thin-Wall. Struct., vol. 81, pp. 29–38, 2014.

F. Odermann and A. Kling, "Shear-compression buckling test method on curved stiffened composite panels", 16th European Conference on Composite Materials, Seville, Spain 22-26 June 2014