Professor Fehmi Cirak

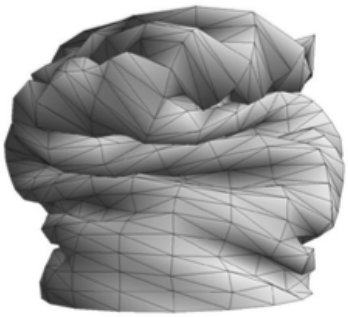

Figure 4: *The collision algorithm must handle difficult buckling situations.*

From: F. Cirak, M. Ortiz, and P. Schröder, "Subdivision surfaces: A new paradigm for thin-shell finite-element analysis", Internat. J. Numer. Methods Engrg., 47(12):2039–2072, 2000)

See:
http://www.eng.cam.ac.uk/profiles/fc286
http://www-structures.eng.cam.ac.uk/directory/fc286@cam.ac.uk

Structures, Computational Mechanics, Dept. of Civil Engineering
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Capsule Biography:
Dr Cirak is active in research and teaching of computational structural mechanics. Prior to Cambridge, he was a Senior/Associate Scientist at the Center for Advanced Computing Research (CACR) at the California Institute of Technology. He has a PhD in Computational Structural Mechanics from the University of Stuttgart and was a Postoctoral Fellow in Aeronautics at the California Institute of Technology.

Research Interests:
Dr Cirak's research is focused on computational modeling and analysis of light-weight structures originating from a wide range of applications, including structural engineering, aerospace and marine engineering. Specific areas of research emphasis include:
. Advanced discretization methods for integrated design, optimization and analysis of solids and structural components such as beams, membranes and shells,
. Computational fluid-structure interaction with application to micro-air-vehicle design and insect flight, and
. Mechanical modeling and computational analysis of large-scale structural membranes, such as parachutes and inflatable decelerators for outer-space applications.

In terms of computational methods development two overriding themes throughout our research are:
. The integration of, traditionally disparate, computational analysis and geometry using immersed and b-spline based finite element discretization techniques,
. The development of scalable computational methods for simulating challenging engineering problems on high-end parallel computers.

Selected Publications:

Eitan Grinspun, Fehmi Cirak, Peter Schröder and Michael Ortiz (California Institute of Technology), “Non-linear mechanics and collisions for subdivision surfaces”, Caltech Report (Date and number not given in the pdf file. The most recent reference is dated 2000
F. Cirak, M. Ortiz, and P. Schröder, “Subdivision surfaces: A new paradigm for thin-shell finite-element analysis”, Internat. J. Numer. Methods Engrg., 47(12):2039–2072, 2000)
Cirak, F. and Ortiz, M. (2001). Fully c1-conforming subdivision elements for finite deformation thin-shell analysis. International Journal for Numerical Methods, 51, (2001), 813–833.
F. Cirak, M.J. Scott, E.K. Antonsson, M. Ortiz, and P. Schröder. Integrated modeling, finite-element analysis, and engineering design for thin-shell structures using subdivision. CAD, 34(2):137–148, 2002.
Cirak, F.; Ortiz, M.; Pandolfi, A.: A cohesive approach to thin-shell fracture and fragmentation. Computer Methods in Appl. Mechanics and Engineering, 194, (2005), 2604–2618.
Cirak, F.; Radovitzky, R.: A Lagrangian-Eulerian shell-fluid coupling algorithm based on level sets. Computers & Structures, 83, (2005), 491–498.
Cirak, F., Deiterding, R., Mauch, S.P., 2007. Large-scale fluid-structure interaction simulation of viscoplastic and fracturing thin shells subjected to shocks and detonations. Computers & Structures 85, 1049–1065.
Deiterding, R., Cirak, F., Mauch, S.P., 2009. Efficient fluid-structure interaction simulation of viscoplastic and fracturing thin-shells subjected to underwater shock loading. In: Hartmann, S., Meister, A., Schäfer, M., Turek, S. (Eds.), International Workshop on Fluid–Structure Interaction. Theory, Numerics and Applications, Herrsching am Ammersee. Kassel University Press GmbH, pp. 65– 80.
Cirak F, Long Q (2011) Subdivision shells with exact boundary control and non-manifold geometry. International Journal for Numerical Methods in Engineering 88:897–923
Long Q, Bornemann PB, Cirak F (2012) Shear–flexible subdivision shells. International Journal for Numerical Methods in Engineering 90:1549–1577