



Professor Dominic Vella Local wrinkling of an indented pressurized shell

See:

<https://www.maths.ox.ac.uk/people/dominic.vella>

<http://people.maths.ox.ac.uk/vella/research.html>

<http://scholar.google.co.uk/citations?user=3Vux4LUAAAAJ&hl=en>

http://www.researchgate.net/profile/Dominic_Vella

<http://scholar.google.com/citations?user=3Vux4LUAAAAJ&hl=nl>

Biography:

I am an Associate Professor in Applied Mathematics at the Mathematical Institute in the University of Oxford and a tutorial fellow at Lincoln College. Within the Mathematical Institute, I am affiliated to OCCAM and OCIAM.

My research is concerned with various aspects of solid and fluid mechanics in general but with particular focus on the wrinkling of thin elastic objects and surface tension effects. You can read more about this and my other work by following the links at the top of this page.

In earlier lives, I studied at Trinity College, Cambridge and did post-docs in Paris (supported by the Royal Commission for the Exhibition of 1851) and in Cambridge.

Research Interests:

My main research interests lie in the general area of continuum mechanics with particular interest in the elasticity of thin objects (including wrinkling) and also in fluid flows that are driven, or controlled, by surface tension.

Selected Publications:

Wrinkling:

A large part of my recent work has focused on understanding highly developed wrinkle patterns. Our primary aim has been to understand the properties of the wrinkle patterns that form in extremely thin sheets, specifically the spatial extent of a wrinkle pattern and the number of wrinkles. The challenge in such problems is that the presence of wrinkles significantly modifies the forces acting on the sheet meaning that traditional buckling analyses are no longer valid.

R. D. Schroll, M. Adda-Bedia, E. Cerda, J. Huang, N. Menon, T. P. Russell, K. B. Toga, D. Vella and B. Davidovitch, Capillary deformations of bendable films, *Phys. Rev. Lett.* 111, 014301 (2013).

E. Aumaitre, S. Knoche, P. Cicuta and D. Vella, Wrinkling in the deflation of elastic bubbles, *Eur. Phys. J. E* 36, 22 (2013).

S. Knoche, D. Vella, E. Aumaitre, P. Degen, H. Rehage, P. Cicuta and J. Kierfeld, Elastometry of Deflated Capsules: Elastic Moduli from Shape and Wrinkle Analysis, *Langmuir* 29, 12463-12471 (2013). [arXiv version]

B. Davidovitch, R. D. Schroll, D. Vella, M. Adda-Bedia and E. Cerda, A prototypical model for tensional wrinkling in thin sheets, *Proc. Natl Acad. Sci. USA* 108, 18227 (2011).

D. Vella, A. Ajdari, A. Vaziri and A. Boudaoud, [Wrinkling of pressurized elastic shells](#), *Phys. Rev. Lett.* 107, 174301 (2011).

D. Vella, M. Adda-Bedia and E. Cerda, Capillary wrinkling of elastic membranes, *Soft Matter* 6, 5778 (2010).

Elasticity of thin objects:

Connected to my work on wrinkling I have also worked on a number of problems in the elasticity of thin objects. This is distinct from my work on wrinkling in the sense that it is not always instability that concerns us.

However, there is a large overlap between this work, my work on wrinkling and my work on 'elasto-capillarity' (see below).

H. Ebrahimi, A. Ajdari, D. Vella, A. Boudaoud and A. Vaziri, Anisotropic blistering instability of highly ellipsoidal shells, *Phys. Rev. Lett.* 112, 094302 (2014).

A. Pandey, D. E. Moulton, D. Vella and D. P. Holmes, Dynamics of snapping beams and jumping poppers, *EPL* 105, 24001 (2014). [arXiv version]

D. Vella, A. Ajdari, A. Vaziri and A. Boudaoud, Indentation of ellipsoidal and cylindrical elastic shells, *Phys. Rev. Lett.* 109, 144302 (2012).

Also highlighted as editor's suggestion and featured in *Physics*, 5th October 2012

D. Vella, A. Ajdari, A. Vaziri and A. Boudaoud, The indentation of pressurized elastic shells: From polymeric capsules to yeast cells, *J. R. Soc. Interface* 9, 448 (2012).

T. J. W. Wagner and D. Vella, The 'Sticky Elastica': Delamination blisters beyond small deformations, *Soft Matter* 9, 1025 (2013).

M. Taroni and D. Vella, Multiple equilibria in a simple elastocapillary system, *J. Fluid Mech.* 712, 273 (2012).

T. J. W. Wagner and D. Vella, The sensitivity of Graphene 'Snap-through' to substrate geometry, *Appl. Phys. Lett.* 100, 233111 (2012). [arXiv version]

Also selected to appear in *Virtual Journal of Nanoscale Science and Technology*, 18th June 2012

T. J. W. Wagner and D. Vella, Floating carpets and the delamination of elastic sheets, *Phys. Rev. Lett.* 107, 044301 (2011).

D. Vella, A. Boudaoud and M. Adda-Bedia, Statics and Inertial Dynamics of a Ruck in a Rug, *Phys. Rev. Lett.* 103, 174301 (2009).

D. Vella, J. Bico, A. Boudaoud, B. Roman and P. M. Reis, The Macroscopic Delamination of Thin Films from Elastic Substrates, *Proc. Natl. Acad. Sci. USA* 106, 10901 (2009).

D. Vella and L. Mahadevan, A simple microscopic model for the dynamics of adhesive failure, *Langmuir* 22, 163 (2006). [arXiv version]