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Cracking me softly – the mechanics of hyperelastic Kirigami structures

CSC/WCPM joint seminar

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Monday, 22nd May, 1 p.m.

MAS2.05/2.06 Seminar room, MAS building

Abstract: Kirigami (from the Japanese 切り kiru = to cut, 紙 kami = paper) is the ancient Japanese art of paper sculptures, and it consists of cutting and stretching a single sheet of paper. The stretch causes the cracks to open and display the decorative pattern. From the mechanical point of view, because of the cracks, a kirigami metamaterial will have lower strength than a pristine sheet. Nonetheless, the cracks will render the sheet more stretchable, hence tougher. Is there then a crack pattern that can achieve both high strength and high toughness? In this talk, I will show simulation tools that can help answer this question, based on my previous works on meshfree methods. In particular, I will present an arc-length solver able to handle very sudden snap-backs occurring in cracks propagating in soft materials under large strains. I will also show attempts to manufacture kirigami structures with the corresponding experimental uniaxial stress-strain curves.

A buffet lunch is available from 12:45 pm.

More info: http://warwick.ac.uk/wcpm/seminars

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