

Abstract Submitted  
for the DFD11 Meeting of  
The American Physical Society

**Wrinkling of wet paper**<sup>1</sup> HO-YOUNG KIM, JUNGCHUL KIM, Seoul National University, L. MAHADEVAN, Harvard University — It is a mundane experience that paper stained with water wrinkles. It is because a wetted portion of paper, which swells due to the hygroexpansive nature of the cellulose fiber network, deforms out of its original plane. Here we quantify the dynamics of wrinkling of wet paper coupled to the capillary imbibition of water into paper using a combination of experiment and theory. While supplying water from a capillary tube that touches the center of a paper strip, we measure the spreading rate of the wet area, wait time for the out-of-plane buckling, and temporal growth of a wrinkling magnitude. Using a theoretical model assuming a linear increase of the strain and an exponential decay of the elastic modulus with the water concentration, we construct scaling laws to predict the simultaneous capillary imbibition and wrinkling rates.

<sup>1</sup>This work was supported by the Wyss Institute of Harvard University.

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Date submitted: 03 Aug 2011

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