Tunable buckling of metabeams
Coulais, Corentin, coulais@physics.leidenuniv.nl; Florijn, Bastiaan; de Reus, Koen; van Hecke, Martin, Leiden University, the Netherlands

ABSTRACT
We probe the buckling of elastic metabeams by means of experiments and simulations. We show that sufficiently wide elastic plain beams exhibit snap through buckling, an unstable form of buckling where the stiffness is negative. We demonstrate that wider beams experience stronger nonlinear deformations and geometric stiffening. Therefore, the distribution of stresses across the beam is distorted and the postbuckling behavior altered. In a second part, we tailor a strain-softening nonlinearity in the material by designing an ordered microstructure close to a pattern transformation, in such a way that we can rationally design the postbuckling behavior of arbitrarily thin beams.