Auxetic bracing

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We consider the following problem in the context of periodic bar-and-joint structures with auxetic deformations. Suppose F is a periodic framework which allows a desired auxetic deformation, but has several degrees of freedom for periodic deformations. How can one add further structural constrains (new bars and joints) so that the enhanced periodic structure deforms with a single degree of freedom and provides locally a good approximation for the desired auxetic path?

We show that a general answer can be given based on the geometric theory of periodic auxetics developed in joint work with Ileana Streinu . The enhanced framework will retain the desired infinitesimal auxetic deformation. The procedure is called auxetic bracing and will be illustrated with several examples in dimension two and three.