

Abstract Submitted
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Independence of bond-level response in disordered networks

CARL GOODRICH, ANDREA LIU, University of Pennsylvania, SIDNEY NAGEL, University of Chicago — Many properties of spring networks, such as bulk elasticity, are a sum of contributions from individual bonds. For disordered systems, these contributions are often characterized by continuous distributions with tails that can be many times larger than the average, leading to the appearance of bonds that are “stronger” or “weaker” than others. However, whether a specific bond is strong or weak depends sensitively on the measurement being made; knowing how a bond responds to compression, for example, tells little about how it will respond to shear. This leads to a new principle for disordered solids: independence of bond-level response. We will show how this principle can be exploited to construct metamaterials with unique, textured, tunable and often extreme response.

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