

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 28 October 2015, 4:00 p.m.
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

Links for fiber-reinforced elastic composites

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Abstract. Elastic properties of composite materials depend not only on the elastic properties of its constituents, but also on its microstructure—the spacial arrangement of constituent materials in a composite. With this said, people frequently encounter special situations where one or more specific combinations of elastic moduli are independent of the microstructure, permitting us to express them in terms of the properties of the constituents. More generally, we are interested in identifying combinations of elastic moduli of a composite that can be expressed in terms of the same combinations of another composite with the same microstructure, differing from the first one only in the values of elastic moduli of its constituents. We call such expressions “links” between the two composites. It turns out that there is a general procedure permitting us to identify each and every link by solving a curious linear algebra problem and performing a matrix-algebra calculation. This last step must necessarily result in a set of mathematically elegant expressions describing the link. In this talk three undergraduate students will describe the theory, give examples, and share the story of their quest for mathematical elegance.