

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

An integrated introduction to the mechanics of solids and fluids: Continuum mechanics as the first mechanics course JENN STROUD ROSSMANN, Lafayette College, CLIVE DYM, LORI BASSMAN, Harvey Mudd College — We have developed an introduction to continuum mechanics for sophomore students without any prior knowledge of mechanics. The essence of continuum mechanics, the internal response of materials to external loading, is often obscured by the complex mathematics of its formulation. By building gradually from one- to two- and three-dimensional formulations, we are able to make the essence of the subject more accessible to undergraduates. From this gradual development of ideas, with many illustrative real-world case studies, students develop both physical intuition for how solids and fluids behave, and the mathematical techniques needed to begin to describe this behavior. At the same time they gain a unique appreciation for the connections between solid and fluid mechanics. It is particularly valuable for students interested in biological applications to appreciate the behavior of engineering materials as a spectrum with Hookean solids at one extreme, and Newtonian fluids at another, with many complex behaviors in between. This approach demonstrates the connections between solid and fluid mechanics, as well as the larger mathematical issues shared by both fields, to students who have not yet taken courses in fluid mechanics and/or strength of materials. The context and foundation provided by this educational strategy are available to students as they continue to study either solid or fluid mechanics, or specialize in the connections themselves by returning to a deeper study of the overarching field of continuum mechanics.

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Date submitted: 01 Aug 2014

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