

Title: Physics Based Methods for Big Data Problems

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Abstract:

Whether seeking safer and more effective means of imaging the human body, developing the next generation of metal alloys for use in cars, airplanes, buildings and bridges, or searching for new sources of energy in the earth's subsurface, the extraction of information from data collected by sensors of all sorts and varieties is central to a broad range of problems facing our country and the world. The era of Big Data has seen remarkable achievements in information processing for problems involving social and economic data, video, and imagery. Up until now, however, Data Science has largely bypassed fields where complex physical phenomenology separates raw data from the information needed to solve a problem. The objective of this very brief talk is to provide an overview of the extensive expertise within the Tufts AS&E faculty on addressing these very interdisciplinary types of problems. After providing a number of concrete examples where we have worked and an overview of traditional solution methods, we turn our attention to recent work in bringing big data methods, specifically those associated with multi-linear algebraic techniques, to bear on this important class of problems.