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Data-driven blood flow modeling with sparse representation AMIRHOSSEIN ARZANI, Northern Arizona University, SCOTT DAWSON, Illinois Institute of Technology — In modeling cardiovascular flows, we are often faced with the difficulty of dealing with incomplete, low-resolution, and noisy data. Experimental blood flow measurement techniques are limited in their spatial and temporal sampling resolutions and acquisition noise is often inevitable. A fundamental problem is how to recover high-quality and high-resolution data from these measurements. In this talk, we discuss how we can leverage the hidden structure in data to tackle these problems. We will discuss compressed sensing, optimal sparse sensor placement, machine learning reduced-order modeling, and matrix completion techniques. For each method, we will demonstrate a simple example related to blood flow modeling. Our results show how sparse modeling can combine sparse data sampling with sparse representation in a hidden basis to recover hemodynamic data from imperfect measurements.

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