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Mark K Transtrum* (mktranstrum@byu.edu), N241 ESC, Provo, UT 84602. *Revealing emergent biological structures through model reduction.*

Mathematical models of biological systems often have many parameters. Available measurements are usually insufficient to accurately constrain these parameters. I discuss a new method for removing irrelevant parameters from complex biological models known as the Manifold Boundary Approximation Method. The method employs an information geometric approach by interpreting the Fisher Information Matrix as a Riemannian metric on the space of all possible models with parameters as coordinates. This interpretation recasts the model reduction problem as a manifold approximation problem. The coarse-grained models vividly reveal the emergent control mechanisms (e.g. feedback loops) that govern the system's behavior but remain expressed in terms of the microscopic parameters (i.e., no black boxes). I demonstrate with several examples. (Received February 15, 2016)