

Physics 7653: Statistical Physics
<http://www.physics.cornell.edu/sethna/teaching/653/>
Material for Week 9
Exercises due Tuesday Nov 6
Last correction at October 22, 2018, 8:26 pm
©2018, James Sethna, all rights reserved

Pre-class Preparation

Thursday

Read: <https://journals.aps.org/prl/pdf/10.1103/PhysRevLett.113.098701> Model Reduction by Manifold Boundaries, Mark K. Transtrum and Peng Qiu, *Phys. Rev. Lett.* **113**, 098701 (2014).

Answer: Presume that a manifold boundary arises when a single parameter θ_α goes to infinity.¹ *Argue that the sloppiest eigenvalue of the Fisher information (or cost Hessian) will go to zero, and the corresponding eigenvector will be a unit vector along direction α .* Submit electronically by 8:30 Thursday morning.

Tuesday

Read: <https://journals.aps.org/prl/pdf/10.1103/PhysRevLett.115.260603> Dissipation bound for thermodynamic control, Benjamin B. Machta, *Phys. Rev. Lett.* **115**, 260603 (2015).

Exercises

6.23: Entropy cost for controlling engines

¹If two parameters θ_α and θ_β go to infinity together with a fixed ratio, as in the example shown in class, then the product $\theta_\alpha\theta_\beta$ can be thought of as the parameter that goes to infinity, while $\theta_\alpha/\theta_\beta$ stays finite.