Title: Optimal finite-time copying protocols
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Abstract:
An elementary operation in any information processing system is copying. Using stochastic thermodynamics and a Lagrangian approach, we derive the optimal protocol to copy the two respective states of the data bit into the memory bit. We show that the average work to copy the two states of the data bit consists of three contributions: the mutual information created between the memory and data bit after copying, a cost due to the mismatch between the initial state of the memory and the data bit, and a finite-time cost. We show how the optimal initial distribution of the memory bit depends on the bias in the data bit and the copy speed. We also discuss how work could be harnessed during the decorrelation step at the end of the copy cycle.