

Processor Speed Control with Thermal Constraints

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- [proc_control_temp.pdf](#)
- [Matlab files](#) (you need [CVX](#) to run some of these scripts)

We consider the problem of adjusting speeds of multiple computer processors sharing the same thermal environment, such as a chip or multi-chip package. We assume that the speed of processor (and associated variables, such as power supply voltage) can be controlled, and we model the dissipated power of a processor as a positive and strictly increasing convex function of the speed. We show that the problem of processor speed control subject to thermal constraints for the environment is a convex optimization problem. We present an efficient infeasible-start primal-dual interior-point method for solving the problem. We also present a decentralized method, using dual decomposition. Both of these approaches can be interpreted as nonlinear static control laws, which adjust the processor speeds based on the measured temperatures in the system. We give numerical examples to illustrate performance of the algorithms.

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