Title:	Efficiencies of power plants, quasi-static models and the geometric-mean temperature
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Abstract:	Observed efficiencies of industrial power plants are often approximated by the square-root formula: 1 − √T −/T +, where T +(T −) is the highest (lowest) temperature achieved in the plant. This expression can be derived within finite-time thermodynamics, or, by entropy generation minimization, based on finite rates for the processes. In these analyses, a closely related quantity is the optimal value of the intermediate temperature for the hot stream, given by the geometric-mean value: √T +/T −. In this paper, instead of finite-time models, we propose to model the operation of plants by quasi-static work extraction models, with one reservoir (source/sink) as finite, while the other as practically infinite. No simplifying assumption is made on the nature of the finite system. This description is consistent with two model hypotheses, each yielding a specific value of the intermediate temperature, say T 1 and T 2. The lack of additional information on validity of the hypothesis that may be actually realized, motivates to approach the problem as an exercise in inductive inference. Thus we define an expected value of the intermediate temperature as the equally weighted mean: (T 1 + T 2)/2. It is shown that the expected value is very closely given by the geometric-mean value for almost all of the observed power plants.
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