Contribution ID: **27** Type: **oral**

Nonuniversality of heat engine efficiency at maximum power

Tuesday, 5 September 2017 16:00 (15 minutes)

We study the efficiency of a quantum dot engine in the condition of the maximum power output. In contrast to the quasi-statically operated Carnot engine whose efficiency reaches the theoretical maximum, recent research on more realistic engines operated in finite time has revealed other classes of efficiency such as the Curzon-Ahlborn efficiency maximizing the power. The linear coefficient of such power-maximizing efficiency as a function of the reservoir temperature ratio has been argued to be universal as $1/2$ under the tight-coupling condition between thermodynamic fluxes. By taking the quantum dot heat engine, however, we show that depending on the constraint posed on the engine, the linear coefficient can be unity, which implies that the efficiency at the maximum power actually approaches the Carnot efficiency in the equilibrium limit. As a result, we dismiss the notion of universal linear coefficient of the efficiency at the maximum power, and discuss the implication of such a result in terms of entropy production and irreversible thermodynamics. We claim that the particular scheme for the linear coefficient of unity is actually more realistic and experimentally realizable, as it corresponds to controlling the gate voltage of the quantum dot, for given temperatures and chemical potentials of the leads connected to the quantum dot.

Primary author: LEE, Sang Hoon (Korea Institute for Advanced Study)

Co-authors: PARK, Hyunggyu (Korea Institute for Advanced Study); UM, Jaegon (Seoul National University)

Presenter: LEE, Sang Hoon (Korea Institute for Advanced Study)

Session Classification: Session 7