



School of Nano Science



IPM Condensed Matter &
Statistical Physics Group

Weekly Seminar

Heat Conduction Characteristics of Nano-confined Gas Medium

Invited speaker: *Dr. Reza Rabani*

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Abstract:

Heat transfer characteristics of nanoconfined gas medium are strongly affected by the gas Knudsen number which includes the effects of the gas density and the characteristics channel height. In the slip regime, the solution of the Navier-Stokes equation along with the first and second-order slip boundary conditions provides an acceptable solution in a continuum framework. On the other hand, for the free molecular regime, the solution of the Collisionless Boltzmann equation provides an appropriate picture of the gas characteristics. Between these two limiting conditions, i.e. in the transition regime, there is no robust analytical solution that could predict a reasonable behavior for the gas medium in detail. While rarefaction effects can be still estimated using kinetic theory-based procedures such as solution of the Boltzmann transport equation or direct simulation Monte Carlo, surface force field and adsorption effects require molecular-level resolution mostly accessible by molecular dynamics. A further complication arises as the channel height decreases to a value smaller than 10 nm as a notable portion of the gas domain is covered by the wall force field which is typically extended about 1nm in the gas medium from each wall. In this talk, a detailed description of the heat transfer characteristics of a nanoconfined gas medium in the transition regime will be presented using the molecular dynamics data.

Wednesday, 21 Khordad 1399 (June 10, 2020), 14:00-15:00

Virtual Seminar Room:

https://meet.jit.si/Nano_Science_WeeklyWebinar