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Propulsion of Nanoobjects between Parallel Heated Plates STEFFEN HARDT, Fachgebiet Technische Thermodynamik, TU Darmstadt, Petersenstrasse 30, D-64287 Darmstadt, SUDARSHAN TIWARI, Fraunhofer ITWM, Fraunhofer-Platz 1, D-67663 Kaiserslautern, Germany — A novel way of inducing motion by thermal gradients is presented. The method relies on a gas contained in a small-scale gap between two surfaces of different temperature at a Knudsen number larger than one. It is assumed that between the parallel plates a rigid body of trapezoidal cross section can move freely. Different from the well-known case of thermal creep, a motion of the rigid body *perpendicular* to the applied thermal gradient can be induced. This is shown by deriving an analytical formula for the net force on the body in the free molecular regime. The main assumptions the derivation is based on are complete thermal accommodation of the molecules at the walls and an angular dependence of the reflection according to Lambert's cosine law. The studies for the free molecular regime are supplemented by DSMC simulations that allow illuminating the case when the mean-free path is of the order of the width of the gap. The DSMC simulations show how the force at intermediate Knudsen numbers deviates from the value of the analytical expression and also easily allow investigating different wall reflection models. The results can be of relevance for the development of novel actuation mechanisms on the nanoscale. Furthermore, they point out a novel way of extracting mechanical work from two reservoirs at different temperature.

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