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Exploiting coupled heat and momentum transfer in nanostructured gas-filled channels TOBIAS BAIER, STEFFEN HARDT, TU Darmstadt, Center of Smart Interfaces — The velocity distribution of a gas confined between surfaces held at different temperatures shows a significant deviation from the Maxwell distribution as long as the mean free path of the molecules is comparable to the channel dimensions. When one of the surfaces is suitably structured this non-equilibrium distribution can be exploited to transfer momentum in tangential direction between the two surfaces. Hence the walls experience a net force parallel to their surface which opens the possibility to extract work from the system. Since both surfaces are held at constant temperature this mode of momentum transfer is different from thermal creep flow that has gained more attention so far. We investigate this situation in the limit of free molecular flow for the case that the unstructured surface is allowed to move tangentially with respect to the structured surface. By this the possibility to operate the system as a thermal engine is investigated and its efficiency assessed.

Tobias Baier
TU Darmstadt, Center of Smart Interfaces

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