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**Melting dynamics of large ice balls in a turbulent flow** ROMAIN VOLK, NATHANAEL MACHICOANE, ENS de Lyon, CNRS et Université de Lyon
— We study the melting dynamics of large ice balls in a turbulent flow at very high Reynolds number. Using an optical shadowgraphy setup, we record the time evolution of particle sizes from which we deduce the heat transfert coefficient as a function of the particle Reynolds number $Re_D$. We study three cases: fixed ice balls melting in a region of strong turbulence with zero mean flow, fixed ice balls melting under the action of a strong mean flow with lower fluctuations, and ice balls freely advected in the whole flow. For the fixed particles cases, heat transfer is observed to be much stronger than in laminar flows, the Nusselt number behaving as a power law of the Reynolds number: $Nu \propto Re_D^{0.8}$. For freely advected ice balls, the turbulent transfer is further enhanced and the Nusselt number is proportional to the Reynolds number $Nu \propto Re_D$. The surface heat flux is then independent of the particles size, leading to an ultimate regime of heat transfer reached when the thermal boundary layer is fully turbulent.

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