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Self-introduced thermocapillary convection in the evaporating process of a suspending drop JINGCHANG XIE, Institute of Mechanics, CAS, NML TEAM — We studied the evaporation process of an evaporating ethanol drop coupled with self-introduced thermocapillary convection. The drop was suspended on the bottom of a rod to reduce the effect of buoyancy. We used different particle tracers to visualize the interior flow field and the gaseous exterior of the drop and measured the temperature distributions inside and outside the evaporating drop. Both good heat conductor and heat insulating material were used as the rod materials to investigate their effects on the surface temperature distribution of an evaporating drop. In the case of a copper rod with ethanol drop in ambient temperature, temperature gradient existed on the drop surface which results in a stable thermocapillary convection and cells appeared near the surface in the drop throughout entire evaporating process. The convection greatly changed the temperature distribution and the way energy and mass transfer. Temperature discontinuity was found existing at the surface of the evaporating drop. The boundary condition at the surface of the evaporating drop can lead to gaseous exterior convective transport. Because of the existence of thermocapillary convection, drop evaporating process or evaporating rate is enhanced.

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