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Dynamics of evaporating and non-evaporating drops falling in  $air^1$ JORGE CHAVARRIA, UNAM, Mexico, SAUL PIEDRA, Conacyt Cidesi-Centa, Mexico, JUAN ARCENEGUI-TROYA, Oxford, UK, LILIA MARGARITA HER-NANDEZ, ITESM, Mexico, GUILLERMO HERNANDEZ-CRUZ, UNAM, Mexico, A.ALFONSO CASTREJON-PITA, Oxford, UK, EDUARDO RAMOS, UNAM, Mexico — We report experimental observations of the dynamics of evaporating and non-evaporating drops falling in the air under the influence of gravity. We use water and acetone drops of approximately 1 mm initial diameter. The experimental rig allows us to observe and acquire the motion for more than 2 m which corresponds to almost one second of flight-time and 80% of its terminal velocity. Under these conditions, evaporation reduces the initial volume by approximately 50% when acetone is used. We find that the motion is rectilinear up to the point where the Reynolds number is 190 and 220 for evaporating and non-evaporating drops respectively; we suggest that under this regime the motion becomes helicoidal in both cases. It is observed that this Reynolds number coincides with the formation of hairpin vortices in the wake. The geometrical properties of the wake of the evaporating drops are visualized using a Schlieren technique. We developed a simple model to predict the position as a function time of evaporating and non-evaporating falling drops in rectilinear motion regime.

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