

## DYNAMIC OF SOOT PARTICLE IN DROPLET COMBUSTION

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### ABSTRACT

This work addresses some particular aspects of the dynamic of soot particles. Soot formation depends on the flow field geometry and the type of combustion (non-premixed). The dimension of soot particles is about nanometer. In this characteristic spatial scale, the main two forces acting on the particle are drag and thermophoretic. The first one pushes soot to the flame, however the second one pulls soot away from the flame. The determination of the conditions in which the drag force prevails leads to a reduction on the particulate emission to the ambient atmosphere, because the soot is burnt at the flame. When the thermophoretic force prevails, the combustion is sooty because the particles do not pass through the flame. Besides that, soot influences fire propagation, mainly in the microgravity condition because the heat transfer by radiation from the soot particles is the main process in the flame propagation. Therefore, the description of the dynamic of such particles will reveal features which will be used in the control of the soot consumption. The results point out that the model with the drag and thermophoretic forces is not valid, because it describes an unstable equilibrium position for the soot inside the fuel side of the flame. From this model, however, an estimation to the conditions of the soot and gas properties for soot being burnt and the characteristic time for the soot dynamic are determined.