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FEASIBILITY AND TRANSITION IN SMOLDERING PHENOMENON

Abstract

Smoldering combustion is of many uses however, if not controlled it is also a source of endless damage. The smoldering intensity depends on two factors viz., presence of external heat sources and combustion transition. Essentially smoldering phenomenon involves non linear heat and mass transfer over surface and is well known as slow combustion. It broadly encountered in nature covering wide range of engineering and industrial applications. Smoldering is attributed with propelling the ignition front normal to the fuel surface at a fixed rate which varies with varying conditions. The work is primarily motivated by the need to have better fire safety and greater skillful applications on earth and in space.

One aspect which has not been addressed is the way the smoldering regression rates are affected with the presence of an external heat source placed at varying orientations.The external heat source is the same fuel placed at selected separation distance. This separation distance between the two fuels is an important parameter investigated in this work.As the separation distance reduces, the heat transfer is expected to rise owing to enhanced heat interactions and regression rates as a consequence. Yet at varting orientations may behave uncertainly. Likewise, transition of combustion from flaming to smoldering is an important issue yet to be completely addressed. Appreciable work had been done but complexity of the problem had prevented through understanding. Present investigations are carried out with specific objective of exploration of the heat interactions on regression rates owing to an external heat source and related implications. The standard incense sticks were used as fuel and uniform horizontal ignition across the width is ensured.Transition of flaming combustion to smoldering is explored on single and parallel fuel configurations at varying orientations.

The results are expected to contribute significant physical insight into parallel fuel smoldering feasibility and transition combustion phenomenon.The science exploration will be immensely useful in noted ground and space applications and safety.