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Critical heat flux and Leidenfrost temperature on Electrical Discharge Machining (EDM) - constructed hemispherical surface

Abstract

This paper reports a Leidenfrost temperature on hemispherical surface constructed by Electrical discharge machining or known as EDM. We focus our study on the droplet evaporation lifetime to investigate and identify the Leidenfrost temperature. Three (3) different types of materials were selected i. e such as Brass (Br), Aluminum (Al) and Copper (Cu). Meanwhile, ethanol liquid has been chosen as the test liquid. Ethanol liquid was elected due to its low boiling point of approximately 78 °C. The droplet impact velocity and droplet diameter was approximately 1.129 m/s and 3.476 mm, respectively. As a result, we finally succeeded in determining the Leidenfrost temperature for all materials mentioned above. On top of that, all the Leidenfrost temperature results, TL were close to the superheat limit temperature of ethanol liquid, TSL which is about 197.8 °C.

Keywords

Droplet; Electrical discharge machining; Evaporation lifetime; Leidenfrost temperature