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Water turbulence effects on vapor blanket present in a flat-ended cylindrical probe at high temperature and, cooled by forced convection ALBERTO CERVANTES GARCIA, Universidad Michoacana de San Nicolás de Hidalgo, MARTIN HERREJÓN ESCUTIA, Instituto Tecnológico de Morelia, GILDARDO SOLORIO DÍAZ, Universidad Michoacana de San Nicolás de Hidalgo, HÉCTOR JAVIER VERGARA HERNÁNDEZ, Instituto Tecnológico de Morelia, ALICIA AGUILAR CORONA, Universidad Michoacana de San Nicolás de Hidalgo, JOSE ROBERTO ZENIT CAMACHO, Universidad Nacional Autónoma de México
— In this work, the effect of turbulent flow on the vapor blanket, which originates in cooling by with water of a flat-end cylindrical probe was studied to observe the flow patterns around the vapor layer and its effect on heat extraction. The experiments to visualize the vapor blanket were carried out in an experimental device using flat-end cylindrical probes made with AISI 304 stainless steel. The probe was heated up to 915 °C and plunged into a tube of plexiglass in which water was flowing. For helping to visualize the streamlines within the fluid, polyamide particles were added to the flow and illuminated with a sheet of laser light to visualize a slice of fluid flow pattern near the probe surface. Water velocities were considered: 0.2 m/s, 0.4 m/s and 0.6 m/s. During each experiment, thermal response data was acquired at 10 Hz. Results show that the vapor layer around the cylinder is stable at water 0.2 m/s, however, when the water velocity is increased, the flow becomes more turbulent, and the vapor layer becomes unstable, and vapor is entrained by eddies originate in the water. All this is reflected in the thermal histories.

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