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A study of the evaporation of heterogeneous water droplets under active heating[1] MAXIM PISKUNOV, National Research Tomsk Polytechnic University, JEAN CLAUDE LEGROS, National Research Tomsk Polytechnic University, Universit Libre de Bruxelles, PAVEL STRIZHAK, National Research Tomsk Polytechnic University — Using high-speed video registration tools with a sample rate of 10^2–10^4 frames per second (fps), we studied the patterns in the evaporation of water droplets containing 1 and 2 mm individual metallic inclusions in a high-temperature gas environment. The materials of choice for the inclusions were steels (AISI 1080 carbon steel and AISI type 316L stainless steel) and pure nickel. We established the lifetimes τ_{h} of the liquid droplets under study with a controlled increase in the gas environment temperature up to 900 K. We also considered the physical aspects behind the τ_{h} distribution in the experiments conducted and specified the conditions for more effective cooling of metallic inclusions. Following the experimental research findings, a method was devised for effective reactor vessel cooling to avoid a meltdown at a nuclear power plant.

[1]The optimization of heat and mass transfer modes was performed within the framework of the strategic plan for the development of National Research Tomsk Polytechnic University as one of the world-leading universities.

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