

Modeling and analysis of flammable hydrocarbon outflows in case of emergency spills, bubbling and vaporization of liquid fuels

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A diagnostic complex for flammable gas droplet emissions of liquid fuels and liquefied natural gas vapors has been created, including aerosol and steam aspirators with brushless gas turbines, infrared gas analyzers, laser multichannel droplet analyzers and capacitive precipitation sensors with digital data transmission to a secure server via an RS-485 communication interface via cable or radio channel.

The above-mentioned complex investigated the outflow of fuels into the atmosphere with crushing of liquid fragments at $Re < 10^5$ and $We < 10^4$. When modeling accidents during large-scale LNG spills on the water surface and soil, the rate of its evaporation and droplet emissions into the atmosphere in the mode of film, transient and bubble boiling of LNG were determined by heat exchange between liquids and the atmosphere. The analysis of vapors and droplets under various modes of bubbling oil, fuel oil, kerosene, lubricating oils, water and liquid nitrogen was carried out.

The work was carried out on the topic of "Development of physical and technical foundations of methods for measuring the parameters of aerosol and vapor-gas clouds that occur during large-scale accidents at fuel and energy facilities and the creation of experimental samples of aerosol cloud diagnostics systems" according to NRC Kurchatov Institute Order.