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Dynamics of liquid nitrogen cooling process of solid surface at wetting contact surface.

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Liquid cryogens cooling by direct contact with cooled surface is very often use as a method to drop the temperature of the devices or equipment i.e. HTS cables. Somehow, cool down process conducting in that way could not be optimized, because of cryogen pool boiling characteristic and low heat transfer coefficient. One of the possibility of increase the efficiency of heat transfer, as well the efficiency of cooling itself, is to use the spray cooling method. The paper shows dynamics analysis of liquid nitrogen cooling solid surface process. The model of heat transfer for the single drop of liquid nitrogen, which impact the flat and smooth surface with respect to the different Weber numbers, is shown. The temperature profiles in the solid are presented, as well, the required cooling time of solid. The numerical calculations are perform for different initial and boundary conditions such as: droplet size, initial velocity, temperature of surface etc., to study how the wetting contact surface is change, and how it contributed to heat transfer between solid and liquid cryogen.

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