

Numerical Simulation of Liquid Nitrogen Spray Equipment for Space Environmental Simulation Facility

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Abstract : Temperature regulating system by gaseous nitrogen is of importance to the space environment simulator, which keep the shrouds in the temperature range from -150°C to +150°C. Liquid nitrogen spray equipment is one of the most critical parts in the temperature regulating system by gaseous nitrogen. Y type jet atomizer and internal mixing atomizer of the liquid nitrogen spray equipment are studied in this paper, 2D/3D atomizer model was established and grid division was conducted respectively by the software of Catia and ICEM. Based on the above preparation, numerical simulation on the spraying process of the atomizer by FLUENT is performed. Using air and water as the medium, comparison between the tests and numerical simulation was conducted and the results of two ways match well. Hence, it can be conclude that this atomizer model can be applied in the numerical simulation of liquid nitrogen spray equipment.

Keywords : space environmental simulator, liquid nitrogen spray, Y type jet atomizer, internal mixing atomizer, numerical simulation, fluent

Conference Title : ICFMTE 2015 : International Conference on Fluid Mechanics and Thermal Engineering

Conference Location : Paris, France

Conference Dates : November 19-20, 2015