

## STUDY ON THE CHARACTERISTICS OF HYBRID LUBRI-COOLING USING CFD ANALYSIS

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### **ABSTRACT**

An investigation of the mass flow rate and pressure parameters of a hybrid water-based nanofluid minimum amount lubrication and cryogenic lubrication/cooling liquid nitrogen system is carried out by means of a computational study. The atomization in turbulent conditions was simulated with the help of a fluent-based fluent solver (CFD) through the use of a discrete phase model (DPM). Here, liquid nitrogen serves as a distinct medium for the nano lubricant. Under various input circumstances, the velocity of the jet mist and the droplet sizes of the spray were measured in order to ascertain the coolant mass flow rate and pressure that would yield the most favorable outcomes. To authenticate the current simulation findings, additional coolant/lubricant simulation data were taken into account. It has been shown that droplets of medium size (about 16.05  $\mu\text{m}$ ) and greater pressure can efficiently lubricate the working zone.

**Keywords:** CFD, droplet size, Hybrid lubri-cooling-velocity.