Characterization of Nanofluid Spray Cooling

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Motivation and Context

Over the last few years there have been big developments in electronic devices. Electronic components are becoming smaller and more powerful.

With this, there’s a rise in their heat fluxes that compromises their performance, without proper cooling.

This is were standard cooling technologies aren’t viable enough.

New cooling processes like **Nanofluid Spray Cooling** takes place, but little studies have been made so far and sometimes their conclusions show opposite cooling performance behaviors.
Nanofluid Spray Cooling

Spray cooling is a way to remove high heat fluxes from hot surfaces. This depends on a large number of parameters:

- Nozzle type
- Surface material
- Droplet dynamics
- Base liquid

Nanofluids are composed by nano scaled particles, such as metals or oxides, that have higher thermal conductivity, thus promoting the base fluid heat transfer.
Study Objectives

• Main parameters affecting Nanofluid Spray Cooling performance when changing their nanoparticle concentration.

• Do they offer better Cooling Performance?

• Viable Solution?
Experimental Setup
Experimental Method – Droplet Dynamics

• Spray Visualization Technique

• Phase Doppler Anemometry
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Spray Cone Angle

Droplets Diameter and Velocity Distributions
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