Analysis of Ligament and Droplet Characteristics Using Deep-learning

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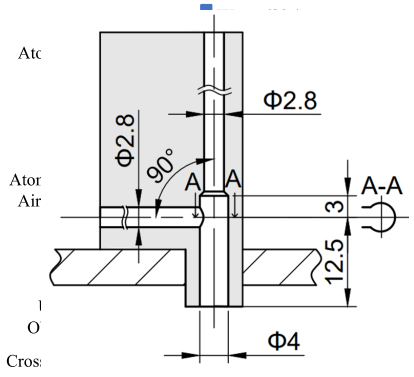

Fig.1 Twin-fluid atomizer

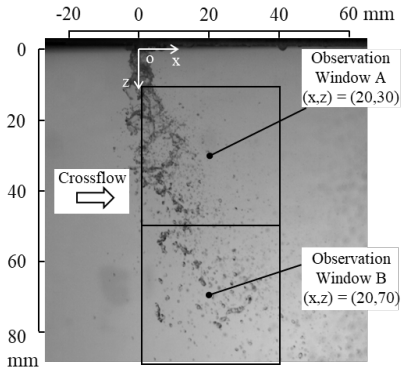

Fig.2 Observation region of jet

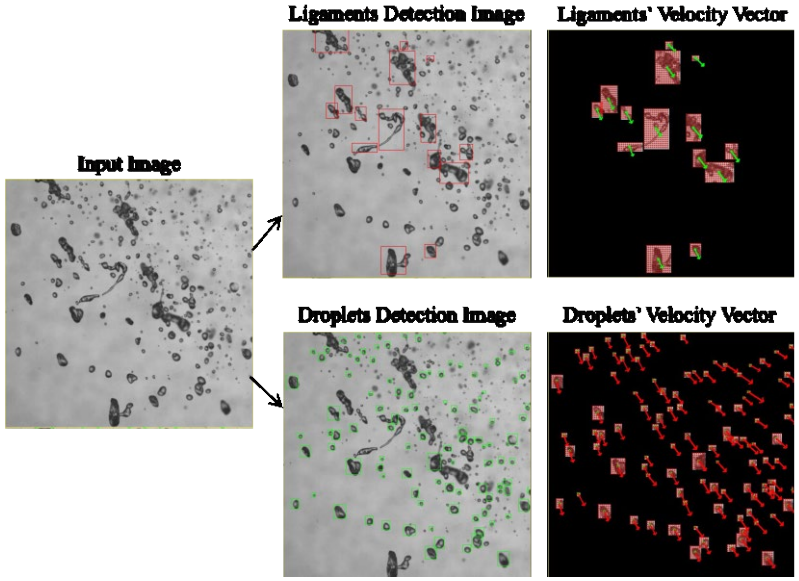

Fig.3 Results of ligament and droplet detection, and velocity vector

Content:

The twin-fluid atomization technology is applied in various industrial fields. In our laboratory, we have designed and manufactured a simple-shaped fuel injection atomizer for gas turbine combustors used in power generation, as illustrated in Figure 1. Figure 2 shows the process of liquid jet breakup behavoir injected from the twin-fluid atomizer in crossflow, resulting in the generation of ligaments and droplets. In Figure 3, the elements enclosed in the red box represent ligaments, while those in the green box represent droplets.

We are taking on the challenge of using deep-learning (DL) to directly measure and analyze the size, velocity, and frequency of occurrence of droplets and ligaments from images. Through these analyses, we aim to reveal the characteristics of ligament breakup and droplets, further expanding the application of the twin-fluid atomizer.

Appealing point:

We would like to extend the current DL code and analysis techniques to all types of spray. Additionally, We aim to reduce the purchase cost of analysis equipment by leveraging DL.

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Research Interest : Twin-fluid atomization

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