

Spray visualisation techniques (Visualisation)

Messgrößen

- Spray Charakterisierung

Prinzip

MATERIAL

A CCD camera with low exposure time and light amplification is required. The possibility to trigger the image acquisition and the direct numerisation are comfortable options. The setting of the optics follows the traditional rules of photography. The greater the focal distance, the greater the depth of field, but the worse the spatial resolution. The smaller the exposure time, the better the droplet distinction, but the worse the light intensity collection.

Though spray visualisations are usually done for qualitative purpose, particle sizing or cluster dimensions can be done while previously focusing on a metric target placed in the plane of interest, with help of a low depth of field.

A PC pilots the image acquisition and stores the pictures. Online process is possible.

LIGHT SOURCE

According to the aim of the study, light sheet (laser or white light) or punctual halogen source can be used.

Background-lighting will allow to observe the different structures of the atomisation (film, ligaments, droplets). Their size can be measured.

Mie-scattering lighting gives an information on the particle cluster shape and position.

POST-PROCESS TECHNIQUE

Averaging a picture sequence in terms of light intensity provides the position of the densest zones of the spray in terms of particles. The similar process in terms of RMS indicates the spatial diffusion of the spray.

Integrating the maxima of intensity over a sequence gives the envelope of the spray.

Other local operation such as integration or FFT of light intensity along a particular direction may reveal the presence of organised density fluctuations within the spray.

Anwendung

The spray visualisations provide an important qualitative data and allow to situate what are the interesting points to be investigated within the spray with quantitative methods. They are recommended prior further analyses.

As long as an optical access is available, there are no restrictions to this technique.

Provided an excitation is done on the spray at controlled frequency, phase locked pictures allow to observe the spray response to the excitation.

The flexibility and range of use of the method is very high (extension to flame behaviour for instance [6]).

Literatur / Referenzen

- P. Berthoumieu. Désintégration de nappe liquide. RT 1/05684-01F DMAE, December 2001.
- F. Giuliani. Analysis on the Behaviour of an Aeroengine Air-Blast Injection Device with Forced Entries. PhD thesis, ENSAE No 346, Toulouse, France, June 2002.



Kontakt

- Dr.-Ing. Thomas Behrendt, DLR-Institut für Antriebstechnik, Tel: +49 2203 601 2008
- Jochen Krampe, Technologiemarketing, Tel: +49 2203 601 3665, Fax: +49 2203 695689
- Dr.-Ing. Alexander Born, Technologiemarketing, Tel: +49 30 67055 155, Fax: +49 30 67055 170
- Dr. Frank Holtmann, Technologiemarketing, Tel: +49 531 295 3420, Fax: +49 531 295 3422

Dieses Handout sowie Querverweise zu verwandten Messtechniken und Anlagen finden Sie unter: <http://messtec.dlr.de/link-72-de>.