

Combined PDA and LDV measurements: Phase discrimination inside a spray using fluorescent seeding particles

by

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ABSTRACT

Laser Doppler Velocimetry (LDV) measurements in the vicinity of reflecting surfaces are still a major problem in many applications of fluid mechanics such as measuring close to walls or wall film surfaces, respectively. Moreover, in any kind of two phase flow a unambiguous separation of the gas and the liquid phase is of particular interest. Commonly used techniques like Phase Doppler Analysers (PDA) with size discrimination are limited to two phase flows where the smallest particle of the dispersed phase is significantly larger than the seeding particles. This condition can rarely be fulfilled in technically relevant spray/air systems. One of the most promising approaches is a phase discrimination using fluorescent tracer particles for the gas phase. In this paper the working principle of the “fluorescent” LDV (FLDV) will be explained. Moreover, the applicability of different fluorescent dyes will be demonstrated. Finally, a comparison between PDA measurements with size discrimination and FLDV measurements inside a hollow cone spray (Fig. 1) will be presented.

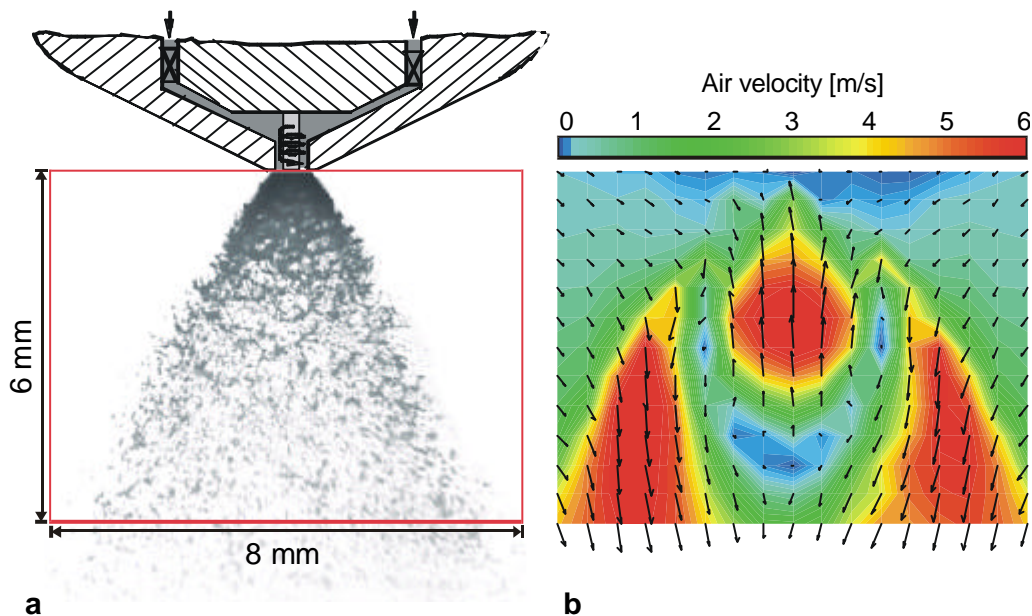


Fig. 1. Visualization of the spray of a pressure swirl atomizer (a) together with the velocity field of its induced air flow determined by Fluorescent LDV (b)