

## Paper 17.4

### Development of a LDV system for measuring acoustic particle velocities in enclosed or free fields

by

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#### ABSTRACT

Although Laser Doppler Velocimetry (LDV) has been used for acoustic particle velocity measurements for many years, its performance in acoustics have not been thoroughly assessed. And yet, this verification appears necessary as the characteristics of acoustic velocities differ significantly from those of fluid flows for which LDV is commonly used. A first step toward a LDV set-up dedicated to airborne acoustics without flow was presented in previous work (Herzog *et al* 1996 ; Valière *et al* 2000). The present study deals first with the validation of LDV measurements in enclosed field using both a commercial equipment (BSA 57N20 by DANTEC), originally built for applications in fluid mechanics, and a system for acquisition and signal processing more specifically dedicated to acoustics. The investigated acoustic frequencies lie between 200 Hz and 4000 Hz while the rms velocities range from 0.1 mm/s to 10 mm/s, which means rapid variations and low amplitudes compared with those usually met in fluid mechanics. Then the present paper focuses on the validation of LDV-measured acoustic velocities in free field : this research is of prime interest as there are many potential applications in acoustics. First results are encouraging but these first experiments need to be followed up by a more complete study and improved experimental conditions are under development for this purpose.