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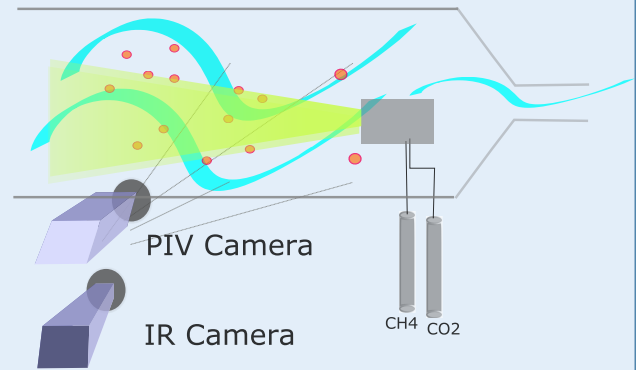
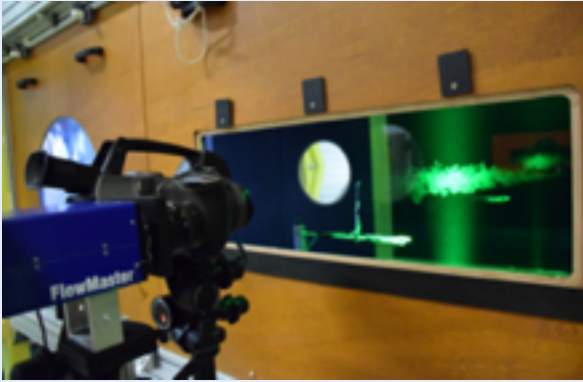
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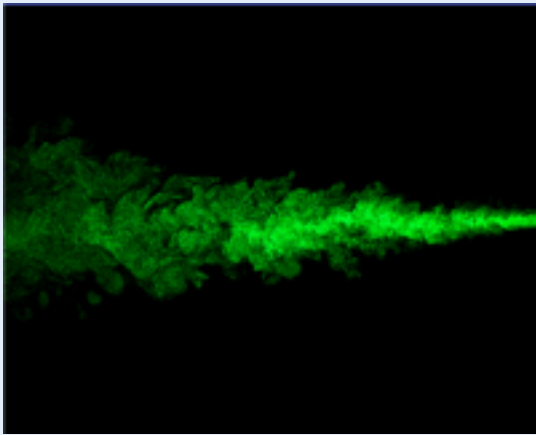
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A mixture of CO₂ and CH₄ is introduced in the wind tunnel (Irstea Rennes, France). The gas plume is seeded with light tracers. The scene is simultaneously captured by a PIV and an Infrared (IR) cameras



Particle image



Infrared image

Optical Flow Estimation out of Infrared Image Sequences of Biogas

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Over the past years, agricultural mechanisation plants have known a steep emergence, encouraged, among other factors, by an estimated high environmental gain. However, the occurrence of the biogas leaks around the installations tends to depreciate the latter. The classical methane loss estimation techniques rely on ballpark figures and numerous simplifying assumptions; as a consequence, they are attached to a loose confidence score. Recently, such leakages have been detected and quantified with infrared (IR) sensors. In particular, optical flow methods have been used to estimate the flow out of the resulting IR image sequences. We address this problem in the current study; more explicitly, we tackle the question of the optical flow estimation out of IR images of biogas. For doing so we i) we build a benchmark mimicking with high-fidelity the outdoor conditions of a real methanisation plant ii) we reconstruct the projected velocity fields of the biogas plume with a technique with uncertainty evaluation iii) we validate our approach by assessing the reconstruction of the gas leakage 2D silhouette out of IR images against instantaneous fields estimated with high accuracy out of particle image velocimetry (PIV) measurements.