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Novel Particle Shadow Tracking Velocimetry Technique¹ CARLOS ECHEVERRIA, DAVID PORTA, CATALINA STERN, ENRIQUE GUZMAN, UNAM, HIDRODINAMICA Y TURBULENCIA TEAM — We present a novel, non-invasive particle tracking velocimetry technique, called Particle Shadow Tracking Velocimetry (PSTV), which is based on the shadows cast by the process particles conveyed within a gaseous phase. Ad hoc digital filters were designed and implemented, in order to detect these solid particles with a high degree of precision. To this end, the methodology relied on the measurement of an Ultra Depth of Field (UDOF) distance required for the correct determination of the detection volume. The PSTV technique produced accurate velocity field values when tested with a validation experiment. We show that the determination of the volume of study is crucial for the correct measurement of the velocity field. To do so, we studied a biphasic solid-gas flow in the compressible regime; the solid phase consisted of a polydisperse granular material with an average size of 0.3mm.

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