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Investigation of turbulent cavitating flows in a small Venturi by fast X-ray imaging GUANGJIAN ZHANG, Arts et Metiers ParisTech, MING-MING GE, Virginia Tech, ILYASS KHLIFA, Arts et Metiers ParisTech, OLIVIER COUTIER-DELGOSHA, Virginia Tech — The cavitating flows created in a small Venturi nozzle are investigated based on ultra-fast x-ray imaging. The instantaneous velocities of the liquid and vapor are measured simultaneously by tracking seeding particles and vapor structures respectively while the vapor volume fraction is derived from the different x-ray attenuation. Wavelet decomposition with appropriate thresholds is used to separate seeding particles from vapor structures, so that image cross-correlations could be applied on the two phases separately. This study presents data on mean velocity and void ratio field, statistical turbulent quantities in three different cavitation levels with the same reference velocity. A type of cavitation associated with a weak but persistent re-entrant jet is described. The comparison between the cavitation and the non cavitating flow shows that the averaged flow field is significantly altered by the presence of cavitation and the vapor formation near the throat area is observed to suppress velocity fluctuations.

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