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Mean Flow Field Measurements in Cavitating Flow Using Magnetic Resonance Velocimetry Supported by X-Ray and Particle Image Velocimetry KRISTINE JOHN, MARTIN BRUSCHEWSKI, University of Rostock, SAAD JAHANGIR, WILLIAN HOGENDOORN, EVERT C. WAGNER, ROBERT F. MUDDE, CHRISTIAN POELMA, Technische Universiteit Delft, SVEN GRUNDMANN, University of Rostock — This presentation focusses on mean flow field measurements in cavitating flow using Magnetic Resonance Velocimetry (MRV). An intrinsic feature of MRV is its ability to measure without optical access. Optical refractions at the phase changes between liquid and vapor phases, which render optical data unusable, do not affect MRV. Moreover, the density of the nuclear spins that is used as a signal source for MRV is typically much higher inside the liquid phase. Void fraction measurements based on signal intensity and measurements of the mean flow velocities in the liquid phase are possible. For a proof-of-concept, flow cavitation in a venturi is investigated. The MRV data is validated with PIV data up to the point of cavitation. For the cavitating cases, X-Ray measurements of the mean void fraction are used as support. It is shown that MRV can provide reliable velocity data. Quantitative void fraction measurements based on the signal intensity of MRV are cumbersome. Flow effects such as turbulence attenuate the signal intensity, which cannot be distinguished from signal voids caused by the vapor phase. The velocity data from MRV must be supported by void fraction data such as from X-Ray. Together, these two techniques provide a valuable tool for studies in cavitating flow.

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