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Time Reversal Acoustic in a flowing medium TRUNG DUNG LUONG, MANISH ARORA, Division of Physics and Applied Physics, School of Physical and Mathematical Sciences (SPMS), Nanyang Technological University, THOMAS HIES, DHI Water & Environment (S) Pte. Ltd., CLAUS-DIETER OHL, Division of Physics and Applied Physics, School of Physical and Mathematical Sciences (SPMS), Nanyang Technological University, CLAUS-DIETER OHL GROUP TEAM, DHI WATER & ENVIRONMENT (S) PTE. LTD. COLLABORATION —
We explore the effect of flow on time reversal acoustics (TRA). Traditionally, TRA has been studied in static conditions, while a motion of the medium is expected to degrade the spatio-temporal focussing of the sound pulse. Here, we study the effect of the flow with a TRA system at 1MHz. A controlled flow is added between the emitter and receiver. Additional, a metallic plate is utilized to increases the numerical aperture of the emitting transducer. The impulse response of the non-flowing system, is recorded and time reversed. Then, the response of the hydrophone is recorded in presence and absence of the flow. It is found that the time reversed signal focuses on at the hydrophone in both the cases. In the absence of flow, the focus signal is observed to be shifted in the time domain. Furthermore, there is a drop in the peak-to-peak value of the focus signal in the presence of flow. For a flow rate of 3 cm/s (Re $\sim$ 1000), a distinct shift in the time domain and a reduction of the peak is obtained. The results will be discussed and compared with numerical simulation of TRA under flow conditions.

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