Techniques to non-invasively characterize and monitor multiphase systems find applications in oil and gas, food and thermal power industries. Use of ultrasound for this purpose seems a viable option as it is cost effective and require minimal intervention once the sensing system is installed. This talk discusses the ongoing research for the development of an in-situ ultrasonic oil-water-gas flow characterization system for use in oil and gas industry. The goal is to be able to non-invasively determine the volume-fraction of the constituents and also the flow rate of the mixture. First, we highlight some of the considerations that need to be taken into account in making such noninvasive measurements. Then, we present an approach to quantify the volume-fraction of the constituents in the mixture based on ultrasonic velocity measurements [1, 2]. Also, we highlight some of the signal processing issues that need to be considered for accurate characterization of oil-water mixture in the presence of gas. Finally, we present some results obtained from the online measurements on multi-phase flow-loop.

References:

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