

From fundamental investigations towards industrial application of ultrasound based in-line rheometry

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The characterization of flow effects and their correlation with the flow properties of multiphase fluid systems is essential to understanding the development of the flow process. How can flow effects be generated and used profitably? This is a key question in our research with the goal of accelerating, optimizing and controlling structure formation in flow. There is a wide range of industrial fluid treatment technologies available that often contain a variety of hidden flow effects. Such flow effects can be named as: slip-stick, memory effect, shear heating, dynamic sedimentation, separation and forced aggregation, fracture and etc. Most of mentioned effects are uncontrollable and as consequence can strongly influence the overall energy consumption of the fluid treatment and, most importantly, they contribute adversely to the characteristic quality parameters of the fluid. Therefore application of non invasive on-line methodology as UVP-PD helps to understand structure-processing relationships and also steer flow effects without interruption of process line. This work gives a number of examples where such methodology can be applied for understanding of flow effects. This know how can be applied for process optimisation and steering of commercial processing. The observations revealed in this abstract provide a solid basis for further fundamental investigations of structure formation regularities and their interaction with processing of any highly concentrated system.