

Ultrasound based In-Line Rheometry (UVP-PD) of Fat Blends

Johan Wiklund

SIK – The Swedish Institute for Food and Biotechnology,
P.O. Box 5401, 40229 Göteborg, Sweden

ABSTRACT

The development of innovative and competitive products has led to an increasing demand for new and improved methods that allow real-time monitoring of quality parameters and fast process control. Rheological properties can be described by fluid rheology and are frequently used as quality control parameters. They can also be correlated with product microstructure, they govern the performance of unit operations and detailed knowledge is fundamental for the design of new process equipment and for predicting e.g. heat transfer. The determination of rheological properties in-line, in real time, thus has a great economical impact and is important for efficient process control and from a quality perspective. In this work we have applied a method for in-line rheometry developed at SIK, The Swedish Institute for Food and Biotechnology, combining the Doppler-based Ultrasound Velocity Profiling (UVP) technique with Pressure Difference (PD) measurements. The method is commonly known as UVP-PD. The aim of the work was to investigate the applicability of the UVP-PD method for rheological characterization and differentiation of different fat blends, in-line in real-time before and after the addition of a crystallizer. Experimental results showed that the UVP-PD method could rheologically differentiate the fat blend without the crystallizer from the one with

crystallizer. It was also shown that the viscosity of the fat blend increased by almost a factor of two after the addition of the crystallizer. The UVP-PD method is an interesting new in-line tool for research and process monitoring of highly concentrated and opaque products such as fat blends.