A User-Friendly Software Interface for Parameter Estimation in the Food Industry

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Design of aseptic (high-temperature, short-time) food processes requires knowing the kinetic parameters for microbial destruction and for quality indicators. However, the dynamic conditions during aseptic processing make estimation of these parameters challenging. Therefore, the most common method to estimate the parameters has been to conduct isothermal studies in thermal death time tubes in small retorts with rapid come-up times. The question arises, “Can parameters be estimated directly from data collected under actual process conditions, thereby eliminating the need for simulated lab studies?” This presentation a) shows how to do this dynamic estimation, and b) provides a live demonstration of our own user-friendly software to do the estimation.

The forward problem and the inverse problem are defined. Scaled sensitivity coefficients are introduced and shown to be important in parameter identifiability. Sequential estimation and optimal experimental design are also introduced as powerful parameter techniques. Two cases studies are presented: 1) The inverse Problem: Estimation of *B. Stearothermophilus* inactivation parameters in pea puree under dynamic heating at retort temperatures of 104, 112, and 120°C ; and 2) The Forward Problem: Use of optimal experimental design methods to determine best aseptic conditions to estimate *B. Stearothermophilus* inactivation parameters under commercial conditions. It is hoped that the user-friendly software and methods presented will aid in designing thermal processes for improved quality and safety.