

Nonlinear Multivariate Monitoring of a Full-scale Industrial Anaerobic Filter Process

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In the application investigated here, nonlinear PLS modeling strategies were applied to a full-scale industrial anaerobic filter process for energy recovery via methane. Many different mathematical models for anaerobic processes have been proposed over the years including Anaerobic Digestion Model No. 1. However, it is not appropriate for all model applications and is limited in its ability to model certain plants satisfactorily from a practical point of view, because it requires that a large number of kinetic and stoichiometric parameters be determined by referring to field data. Every specific plant has its own process environmental conditions and process operations, making it difficult to develop an accurate general model. Therefore, nonlinear PLS modeling approaches, which have a distinct ability to model nonlinear processes only based on historical operational data, were employed to develop a reliable and accurate process model in minimal time and with minimal cost. The modeling capabilities of these approaches were assessed through their prediction accuracy and performance characteristics.