Development of a Fuzzy Logic-based Inherent Safety Index

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ABSTRACT

Inherent safety has been recognized as a design approach useful to remove hazards or reduce hazards at the source instead of controlling them with add-on protective barriers. However, inherent safety is based on qualitative principles that cannot easily be evaluated and analyzed, and this is one of the major difficulties for the systematic application and quantification of inherent safety in plant design. The present paper introduces the use of fuzzy logic for the measurement of inherent safety. The proposed methodology describes the development of an overall index for use in process simulation and process synthesis to generate inherently safer alternatives and to evaluate them in a systematic and rapid way.

The application to process simulation is expected to be useful for the application of inherent safety to operating plants. The use of fuzzy logic is helpful modeling uncertainty and subjectives implied in evaluation of certain variables and it is helpful for combining quantitative data with qualitative information. This paper focuses only on the development of a fuzzy logic-based inherent safety index, which constitutes the first step toward a systematic application of inherent safety.