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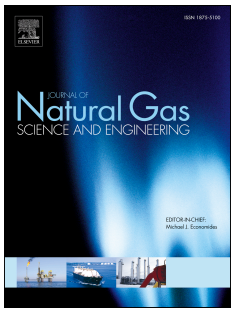

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A Unique Adaptive Neuro Fuzzy Inference System for Optimum Decision Making Process in a Natural Gas Transmission Unit

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Abstract

In this study, a unique adaptive neuro fuzzy inference system for optimization of decision making process in natural gas transmission unit is presented. To do this, macro-ergonomics and integrated resilience engineering factors are considered as outputs to assess operators' performance and decision styles. Evaluation of decision-making styles of control room operators would help managers adjust job specification with human characteristics. In this regard, a pertinent standard questionnaire is designed to collect required data. Operators' decision styles are identified by standard questionnaire and, then, their efficiency values are calculated by considering macro-ergonomics factors through a unique adaptive neuro-fuzzy inference system (ANFIS). Moreover, fuzzy data envelopment analysis (FDEA) model is applied to validate the obtained results. Analysis of variance is used to investigate the results of ANFIS. The results show that the best decision style is flexible DM style wherein information is pertinently used as needed and there are multiple focuses for making decisions. In addition, the results reveal that information flow, safety, system efficiency, redesign, preparedness, and learning have the lowest efficiency values amongst macro-ergonomics and integrated resilience engineering factors and require more attention. Then, DM speed and violation of regulations obtain the best results in the gas transmission unit. This is the first study that introduces a unique intelligent adaptive