



DEVELOPMENT OF SOFT SENSOR TO ESTIMATE MULTIPHASE FLOW RATES USING NEURAL NETWORKS AND EARLY STOPPING

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Abstract- This paper proposes a soft sensor to estimate phase flow rates utilizing common measurements in oil and gas production wells. The developed system addresses the limited production monitoring due to using common metering facilities. It offers a cost-effective solution to meet real-time monitoring demands, reduces operational and maintenance costs, and acts as a back-up to multiphase flow meters. The soft sensor is developed using feed-forward neural network, and generalization and network complexity are regulated using K-fold cross-validation and early stopping technique. The soft sensor is validated using actual well test data from producing wells, and model performance is analyzed using cumulative deviation and cumulative flow plots. The developed soft sensor shows promising performance with a mean absolute percent error of around 4% and less than 10% deviation for 90% of the samples.

Index terms: Multiphase Flow, Soft Sensor, Virtual Flow Meter, Neural Network, early stopping.