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A simple technique to use decline curve equation by avoiding violation of its assumption

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Conventional Arp's decline equation is widely used in petroleum industry because it requires less information. However, Arp's equation is based on four important and widely violated assumptions. The aims of this study are to use decline equation without violating its assumptions and identify the well health issue. Due to high demand of gas, most fields under Petrobangla are producing at varying rates. This study finds a simple technique to use decline equation with obeying the assumptions. The main two parameters of Arp's equation are decline exponent 'b' and initial decline rate 'Di'. These parameters are calculated using production data by arranging the equation as a straight line. This indicates that if these are calculated using production data which are obeying the assumption/s and decline equation is verified by history matching then the equation would more likely be realistic to use. In this approach, first, well-head flowing pressure with time is plotted and the pressure trend is observed, and selection of the time slot is made where pressures are steady or approximately stable. This time slot is chosen as reference. If necessary, elimination of out of range pressure data is employed using any standard statistical method. Then, the production data within the referred time slot is used for calculating "b" and Di values. Finally, history matching is conducted to validate the final form of the derived equation. This technique is successfully used in Kailastila gas field in Bangladesh and finds that expected production data perfectly match the actual data. The reserve estimated by decline analysis is justified by flowing material balance. The equation is used to identify well health issue such as liquid load. The issue is verified by pressure analysis and exiting field data and information.

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Computational fluid dynamics and measurements of hydrodynamic properties of trickle bed reactor

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Trickle bed reactors have been used in this study to examine flow regimes transition for evaluation and validation of computational fluid dynamics (CFD) and for developing the needed closures and interfacial forces models for water-air- solid system. The system of wet catalytic oxidation of phenol, present in refinery waste water, has been chosen as a model reaction to obtain the profiles. This work focuses on investigating the bubble dynamics (i.e. local gas holdup and bubble velocity) in trickle bed reactor. The oxidation reaction was examined in a 2 cm diameter and 80 cm length with a catalyst bed length of 32 cm. The residual phenol concentration and intermediate compound concentrations were used as a product model. Two advanced measurements were implemented in this work which were pressure transducer and fiber optical probe. The results of both techniques have been compared. The results show good overall agreement between the two methods and CFD simulation for the overall horizontal profile of both bubble size and gas holdup.

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