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Mixed Integer Model for Grassroots Petroleum Refinery Superstructure Optimization

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A model is developed to compute the optimal processing network for a petroleum refinery system. A superstructure representation that is sufficiently rich to encompass all possible topology alternatives (process technologies and interconnectivities) of a conventional refinery comprising 96 commercial process units is established. A mixed-integer linear model that maximizes refinery profit is formulated according to the constructed superstructure with logic propositions on certain design and structural specifications. A numerical example is illustrated to implement the modeling approach wherein more than two million plot plans are numerically evaluated to generate a globally optimal refinery network topology that promotes significant increase in refinery profit. Other refinery case studies are discussed and the results are compared with existing refinery systems to illustrate the applicability and benefits of the approach. The algorithm is further shown to be useful in studies leading to the upgrading and increasing the profitability of existing refineries.

Biography:

Prof. Tareq A. Albahri received B Sc and M Sc in chemical engineering from Kuwait University and PhD in chemical engineering from the University of Texas at Austin. He worked as a process engineer at KNPC MAB Refinery from 1987 to 1994, visiting professor at the University of Waterloo in Canada in 2005 and the University of Texas at Austin in 2008, and is now a professor in the chemical engineering department at Kuwait University since 2000. Prof. Albahri published numerous journal and conference papers on petroleum refining and fuel chemistry, and holds nine US Patents in various fields.