ENGINEERING

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ABSTRACTS

The Physical Factors for Considering an Agitator for Liquid-Gas Transfer. Robert H. L. Howe, Eli Lilly and Company Tippecanoe Laboratory, Lafayette, Indiana 47906.——In considering an agitator for its capability of achieving the maximum liquid-gas transfer, a number of physical factors must be understood and determined. The relationship of the fine gas bubbles and the shearing stress provided by the agitator must be investigated because the smaller the size of the gas bubble, the better is the transfer according to the law of diffusion. The small bubble size can be achieved by a large shear stress produced by an impeller of sufficient diameter rotating at a high speed. Also, maximum turbulence improves the interfacial absorption and transfer of a liquid-gas system. The physical conditions of the vessel are important to the transfer. It is desired to have maximum gas flow at maximum partial pressure in a reasonably small fluid volume and the optimally low temperature, yet at a relatively high superficial velocity through a minimum liquid depth in order to achieve the maximum transfer.

The Solution and Applications of Optimal Limited State Feedback Control. Thomas B. Cunningham and Robert L. Swaim, School of Aeronautics and Astronautics, Purdue University, Lafayette, Indiana 47907.——The application of optimization theory to linear feedback control systems design is easily developed and has useful application in regulator problems. The major drawback has been the requirement that all the states of the dynamic mathematical model of the system under investigation be measured for feedback. This problem can be eliminated by using a Kalman filter or by applying a Luenberger observer of lower order. These ideas, however, still limit the designer's option to fully represent the physical plant, *i.e.*, higher order model, because of his desire to minimize the filtering necessary.

Use of limited state feedback enables one to use the full state model order while designing the feedback grains based upon prescribed number of output measurements. Artificial generation of unmeasured states is not necessary, therefore allowing an unconstrained model size.

This paper demonstrated the use of the necessary conditions for limited state feedback in a solution scheme for the optimal feedback gain matrix. Applications were stressed which included colored noise inputs, how to eliminate states from the measurement vector, and inclusion of filter dynamics with associated measurement noise.