Design of Agitated Pulp Stock Chests with Side-entering Impellers

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Abstract

Agitated pulp stock chests are the most common mixer used in pulp and paper manufacture. They serve a number of purposes, including blending of pulp suspensions, chemical contacting, consistency control, modification of fibre properties and attenuation of process disturbances. Chest design is based on past experience using proprietary information developed largely on empirical correlations. One significant difficulty in the design process is specification of the pulp suspension rheology. Pulp fibre suspensions are non-Newtonian and display a yield stress, with their flow behaviour significantly dependant on the suspension mass concentration. In past work the suspension rheology has been characterized using 'factors' which are estimated based on pulp type and past experience or determined after the fact. In the present work, installed chest design strategies are reviewed, and the characteristics of current deigns evaluated based on pilot-scale and industrial-scale measurements. A design method is proposed based on the desired cavern size formed in the vessel by matching the momentum generated by the impeller(s) with the yield stress of the suspension. This procedure is compared with other deign methods. Scaling criteria are also discussed.