

Optimization of the Pulp Mill Economical Efficiency; study on the behavior effect of the economically significant variables

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Extended Abstract: Due to the continuously increasing competition in the pulp and paper industry, there is a need to develop solutions that can increase the economical efficiency of the plants. Nowadays, the trend is to optimize the whole mill with respect to production and quality, minimization of energy, chemical consumption and effluents.

In the recent paper Castro and Doyle (2004) have proposed the Pulp Mill benchmark model, having the standard architecture with a Kamyr digester, a bleaching plant and a chemical recovery. Further Mercangöz and Doyle (2008) have performed the optimization of the benchmark model. The optimization is based on the approximation of the steady state values of the economically significant variables by linear functions of the decision variables (the decision variables are mainly setpoints of the control loops, the economically significant variables are mainly the most important manipulated variables of the plant).

Different pairs of the economically significant variables and decision variables have both linear and nonlinear dependences. In addition, some decision variables are interacting with each other. In this paper the benchmark problem is restudied in relation to the different approximation approaches of the economically significant variables as functions of the decision variables. The two following approaches are proposed: first approach of the sum of the one dimensional quadratic functions and the second approach of the multidimensional quadratic functions.

The optimizations are performed for the linear and proposed approximation techniques, results presented and compared. Economical improvements have been achieved and reported.

Keyword: Plantwide optimization, Pulp and Paper production, response surface approximation.