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AN OPERATING PARAMETERS SETTING METHOD USING EMPIRICAL DATA FOR SLASHING PROCESS

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Abstract. *A novel operating parameters setting method is proposed for slashing process. Firstly, in order to describe complicated nonlinear relationship between operating parameters and quality indicator in slashing process, a predictive model using empirical data is built by a neural network. And this predictive model is used to generate a large set of simulated data under different operating conditions. Then an inverse neural network is employed to determine the operating parameters which satisfy desired quality indicator. To avoid the multiple answers problem, the constraints are involved to limit the uniqueness of solution, and the feasibility of solution is checked further with the predictive model. The specific example shows that the proposed operating parameters setting method using empirical data is effective.*

Keywords: Slashing process, Operating parameters setting, Predictive model, Inverse neural network, Empirical data

1. **Introduction.** The slashing process is a very important procedure in textile manufacturing processes. The performance of the warp in the weaving department and ultimately the quality of the woven fabric depends very much on the slashing process. The object of slashing is to prepare the warp which can stand the stresses, strains and abrasive forces that are acting on the yarn which is impregnated with the paste mainly composed of adhesives and lubricants or softeners to increase the tensile strength, better fiber-lay and resistance to abrasion [1]. However, the operating parameters of slashing process are difficult to be determined accurately. And the inaccurate operating conditions will lead to reduce productivity and product quality problems [2]. It is a significant issue for researchers how to adjust the operating parameters for slashing process to satisfy a desired quality indictor, improve product quality, and reduce product costs.

Although the reliable approach to operating parameters setting has been developed by precise first-principle models, such precise first-principle models are not available in most processes, and modeling of a complex industrial process is very difficult and time-consuming [3]. In particular, the slashing process employs complex physical, chemical and thermal changes, it is difficult to build precise first-principle models that can explain why the desired quality appears in products. For example, the relationship between operating conditions and desired product quality such as size add-on (the amount of size added to the yarn) is not clear in slashing process. And the product quality has been still maintained by skilled operators on the basis of their experience and intuition. Although much effort has been devoted to clarify the relationship between operating conditions