Twisting Robustness in the Ring Spinning System with Single Friction-belt False-twister

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Recently, friction-belt false-twister adopted on a ring spinning frame has been developed for producing yarns with unique structure and properties.[1,2] In this study, special attentions have been focused on twisting process because it is of great importance to determine the structure and properties of resultant yarn. Uniform twists inserted into the yarn ensure even features and good yarn quality. Twist variation in the spinning process may results in poor spinnability as well as uneven features or imperfections of the resultant yarns, such as strength deterioration, diameter irregularity and wrapping fibers along yarn length. On the other hand, for a stable process or product, it should permit a certain tolerance for the system variation or error.

Therefore, it is crucial to investigate the impinge of twisting robustness in the spinning process as well as evaluation of the yarn quality subject to external perturbations. Based on twist kinematics, equations are derived to evaluate the twist variations subject to external perturbations. Although several basic simplifying assumptions have been necessary in order to make the analysis manageable, the findings have given a clear indication of the significant twist levels that can develop in the zones of the machine. The model is then verified by the experimental observations and a good agreement has been made. It has been proved by the experiment that with ±10% periodic variation in false-twisting rate, the yarn properties are not significantly affected. In another words, the current configuration and system parameters are stable and robust as well as have a high tolerance for twist variations.[3]

The main purpose of this study is to assess the stability and robustness of the modified technique as well as comprehending the effect of system parameters on dynamical twist redistributions. At the least, the results should give rise to a better comprehending of the mechanism of false-twister adopted in a ring spinning frame and provide method of calculating the practical levels of twist control required to reduce certain remarkable yarn faults.

REFERENCES

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ACKNOWLEDGMENT

This research was funded in part through research grants from the Research Grants Council of the Hong Kong Special Administrative Region, China (Project Nos 525113, 15215214), National Science Foundation of China (Project No. N-PolyU502/12) and a postgraduate scholarship by the Hong Kong Polytechnic University.