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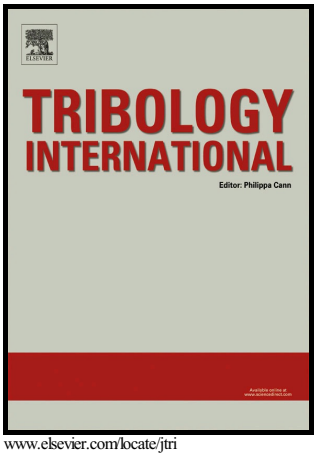

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Stick-slip behaviours of water lubrication polymer materials under low speed conditions

Conglin Dong[a], Lichun Shi[a], Lvzhou Li[a], Xiuqin Bai[b], Chengqing Yuan[b], Yu Tian[a*]

[a]State Key Laboratory of Tribology, Tsinghua University, Beijing 100084, China

[b]Key Laboratory of Marine Power Engineering & Technology (Ministry of Transport), Wuhan University of Technology, Wuhan 430063, P.R. China

[*]Corresponding author. tianyu@mail.tsinghua.edu.cn

Abstract

This study investigated the different stick-slip behaviours of ultra high molecular weight polyethylene (UHMWPE), synthetic rubber (SR) and fiber resin composite (FRC) polymer materials with $ZCuSn_{10}Zn_2$ plates under water-lubricated conditions on an UMT-3 tribo-tester. The stick-slip phenomena of the polymers at the starting processes were significant and led to different frictional noise emissions. With better hydrophilicity and viscoelasticity, fiber resin composite resulted in the smallest frictional noise. A better hydrophobicity and worse self-lubricating property resulted in the largest stick-slip phenomenon and frictional noise of synthetic rubber. Thus the results disclosed the relationship between the lubrication property of the polymers and their frictional noise performance, and could be of help for the selection of high performance water lubrication materials.

Keywords: Water lubrication; polymer; tribological property; stick-slip phenomenon.

1. Introduction

Polymer materials are usually green and pollution-free materials with highly resistant to fatigue and wear. Moreover, they could absorb vibration, and have excellent chemical stability to resist corrosion [1, 2]. Therefore, polymer materials, such as modified rubber, reinforced phenolic resin, new type nylon, special polyurethane, engineering plastics and so on, are widely used to make water-lubricated polymer stern tube bearings for marine equipments [3-7]. Their tribological