Influential Factors on Adhesion between Wheel and Rail under Wet Conditions

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Study on the adhesion of wheel/rail system includes a lot of research fields such as tribology, rolling contact mechanics, material science, structural dynamics, heat transfer and others. The authors focused on several parameters which play very important roles in affecting the adhesion coefficient of wheel/rail interface. Those parameters, which include running speed, water temperature, wheel load and surface roughness of wheel and rail, have great influence on hydro-lubricate behavior of water film formed at wheel/rail interface from the tribological point of view. This paper describes the relation between those parameters and their influence on the adhesion coefficient by means of both theoretical and experimental approaches. Numerical analysis was based on the Mix-lubrication theory, and a laboratory experiment was conducted with a twin-disc rolling contact machine. The numerical solutions and the experimental results indicated that the effects of running speed, water temperature and surface roughness of wheel/rail interface on the adhesion coefficient were significant.