ABSTRACT
A profound description of friction in wheel-rail contact plays an essential role for optimization of traction control strat-egies, as input quantity for railway simulations in general and for the estimation of wear and rolling contact fatigue. A multitude of wheel-rail contact models exists, however, traction-creepage curves obtained from measurements show quantitative and qualitative deviations. There are several phenomena which influence the traction-creepage characteris-tics: Mechanisms resulting from surface roughness, frictional heating or the presence of interfacial fluids can have a dominating influence on friction. In this paper, a new wheel-rail contact model, accounting for these influential parame-ters, will be presented. The presented model accounts for the interaction of a interfacial fluid model for combined boun-dary and mixed lubrication of rough surfaces with a wheel-rail contact model that additionally accounts for frictional heating. A quantitative comparison with measurements found in the literature is not conducted, since the exact condi-tions of the measurements are mostly unknown and parameters can easily be adjusted to fit the measurements. Empha-sis is placed on the qualitative behavior of the model with respect to the measurements and good agreement is found. The dependence of the traction on rolling velocity, surface roughness and normal load is studied under dry and water lubricated conditions.