

Shoe Sole Tread Designs and Outcomes of Slipping and Falling on Slippery Floor Surfaces

Liwen Liu, Yung Hui Lee, Chiuhsiang Joe Lin, 李開偉, Chih Yong Chen
Industrial Management
Management
kai@chu.edu.tw

Abstract

A gait experiment was conducted under two shoe sole and three floor conditions. The shoe soles and floors were characterized by the tread and groove designs on the surface. The coefficients of friction (COF) on the floor in the target area were measured. The subjects were required to walk on a walkway and stepping on a target area covered with glycerol. The motions of the feet of the subjects were captured. Gait parameters were calculated based on the motion data. Among the 240 trials, there were 37 no-slips, 81 microslips, 45 slides, and 77 slips. It was found that the condition with shoe sole and floor had both tread grooves perpendicular to the walking direction had the highest COF, the shortest slip distance, and the lowest percentages of slide and slip. The condition with shoe sole and floor had both tread grooves parallel to the walking direction had the lowest COF and the longest slip distance among all experimental conditions. The Pearson's correlation coefficients between slip distance and slip velocity, time to foot flat, foot angle, and compensatory step length were 0.82 (p, 0.0001), 0.33 (p, 0.0001), 20.54 (p, 0.0001), and 20.51 (p, 0.0001), respectively.

Keyword : Gait analysis, slippage parameters, RCOF, shoe-floor interface