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V. F. USHKALOV, T. F. MOKRII, I. Yu. MALYSHEVA, N. V. BEZRUKAVYI

PREDICTION OF IN-SERVICE RAIL HEAD WEAR

Institute of Technical Mechanics
of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine
15 Leshko-Popel St., 49005,Dnipro, Ukraine; e-mail: Mokrii.T.F@nas.gov.ua

An increase in train speed and freight traffic volume and range, the development of passenger traffic, and the adaptation of the railway network to cars with increased axle loads call for comprehensive experimental and theoretical studies of vehicle–track interaction processes. In particular, the prediction of rail condition and wear attains great significance. Here, two approaches may be distinguished. One is the prediction of rail side wear and service life, and the other lies in theoretical investigations into the prediction of the wear-caused change of the rail head shape.

The aim of this work was to develop a method for the theoretical prediction of rail head profiles under wear. Use was made of methods of mathematical simulation, numerical integration, oscillation theory, and statisticфl dynamics.

This paper presents a method for the prediction of successive rail wear and rail head profile change with the use of a mathematical model of wheel–rail interaction with distributed contact forces. The prediction algorithm is based on a numerical integration of the system of differential equations that describe the spatial oscillations of a rail vehicle moving over a track of arbitrary alignment.

The software developed was verified in the prediction of R65 rail head wear in a tangent track section and in a circular curve for a loaded gondola car with standard 18-100 trucks and standard wheels with different degrees of rim wear. The predicted data were compared with experimental ones. It was shown that the proposed method sufficiently accurately predicts the wear-caused change of the rail head profile.

Keywords: *prediction of successive rail wear, software verification, gondola car, comparison of predicted and experimental data.*

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