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Railway Vehicle Simulation Using Non-Elliptical Wheel–Rail Contact Model

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An approximate model of wheel-rail contact, which does not lead to stiff equations of motion and can be used for non-elliptical contact area, is considered. The elastic Winkler foundation model is employed to find the contact patch configuration and the distribution of the normal pressure. The foundation modulus is determined with the help of the half space method. The FASTSIM algorithm, which was adapted for non-elliptical contact area, is applied for solving the tangential contact problem. An analytical solution of the tangential problem for a slice of the contact patch in the formulation of Kalker's simplified theory is used in the model. Results of contact problem solution and wheel wear prediction for a locomotive equipped with radial steering bogies using an algorithm based on the model are given.

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