

STUDY OF THE ELASTICALLY DEFORMED STATE OF A WHEEL-RAIL PAIR WITH DIFFERENT INITIAL PROFILES AND WEAR DEGREE

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A topical problem for the Ukrainian railway transport is its integration into the world's transport system. The Ukrainian and the European railways differ in rail track parameters, which complicates railway communication. As shown by international experience, the most promising way to resolve this problem is to use gage-changeable wheelsets, which may be adjusted to different track gages. Besides, the Ukrainian and the EU railways use different wheel and rail profiles, whose shape greatly affects the rail-vehicle interaction. In service, the profile geometry may change significantly due to contacting pair wearing-in, which may result in a number of negative consequences caused by rail and wheel profile mismatch. The aim of this work is to study the effect of the wear-caused change of the initial rail and wheel profiles on the elastically deformed state of wheel-rail pairs for wheelsets operating on 1,520 mm and 1,435 mm gage railways without truck change. Worn wheel and rail profiles were studied by mathematical and computer simulation. The elastically deformed state of a wheel-rail pair was studied by the finite-element method, which allows one to analyze various complex-geometry engineering structures and perform a 3D simulation of physical processes. The interaction of worn wheels and rails with initial profiles used on 1,520 mm and 1,435 mm gage railways was analyzed to give the contact stress distribution over the wheel and rail profile zones for wheel-rail contact pairs theoretically possible in Ukraine-EU railway communication. This made it possible to assess rail-vehicle interaction conditions in Ukraine-EU railway communication without wheelset change. The results of the study of the effect of wheel profile change on the elastically deformed state made it possible to formulate recommendations on the practicability of existing profiles and direct ways to improving the profile geometry of wheelsets operating on 1,520 mm and 1,435 mm gage railways without truck change.

Keywords: *Ukraine>EU railway communication, worn wheel and rail profiles, elastically deformed state of a wheel-rail contact pair.*

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