



ACADEMIC YEAR 2013 – 2014

TITLE OF DIPLOMA THESIS:

Study of the transverse behavior of railway vehicles in alignments and curves -
Overview, assessment and optimization of simulation models

AUTHOR: Alexandra Giannelou

ABSTRACT

This paper investigates the simulation models of the transverse behavior of railway vehicles in straights and curves and approaches the optimization of simulation model RailJolyPyrg. This model is used for the study of the transverse behavior of railway vehicles equipped with conventional bogies. Particularly, at first, a theoretical approach of the dynamic behavior of railway vehicles, while moving on the railway line, takes place, focusing on their transverse behavior. Various simulation models of dynamic behavior are searched and analyzed, either they are available for sale or no, like RailJolyPyrg, and a comparative presentation of them is made. This is to evaluate the model mentioned above, in order to investigate its possible shortages and advantages and, consequently, to be optimized. After the evaluation, the points, where the optimization should take place, are searched. These are a more user - friendly environment for system's parameters input, an open source software to run the model and a more convenient and efficient form of exported results. Finally, using the optimized model RailJolyPyrg, the value of critical speed, for movement in straights, as well as the minimum radii of curvature in the horizontal alignment and slip and wheel contact conditions, for movement in curves, is studied. The study refers to metro, tram, high speed and conventional speed rail networks. Moreover, the influence of wheel equivalent conicity and half of the springs' transverse distance of primary suspension on the critical speed's value is investigated, as well as the influence of bogies – axles longitudinal stiffness and radii of curvature on the lateral displacement of axles of front bogie, longitudinal component of creep forces, gravitational forces and guidance forces, for motion both in straights and curves.

KEYWORDS

transverse behavior of railway vehicles, simulation models, conventional bogies, critical velocity, slip conditions