

Assignment of the Master's Thesis in the Program Electrical Engineering and Information Technology

Topic: Sensitivity Analysis of the Gamma Model with Changes in Vehicle Parameters in ETCS Signal-Controlled Rail Traffic

Task:

In the course of this work, a sensitivity analysis of individual parameters of the ETCS braking models Gamma and Lambda for the calculation of braking points and curves will be conducted. This also includes a consideration of cross-border rail traffic.

Rail traffic in Europe has historically been shaped by national differences in all areas. With the integration of Europe, the need for cross-border rail traffic has become increasingly important. The introduction of the European Train Control System (ETCS), a Europe-wide standardized train control system, aims to address this issue. A key component of the ETCS is the calculation of braking curves and braking points that depend on vehicle speed. This calculation depends on the characteristics of the vehicles used and route-dependent specifications, known as National Values.

As part of this work, a sensitivity analysis of individual parameters of the Gamma model will be conducted. This model for calculating ETCS braking curves and braking points uses vehicle-specific parameters as input variables. The analysis will demonstrate how sensitive the model is to changes in deceleration values and correction factors.

To achieve this, a tool will be developed that compares the vehicle parameters of existing braking systems/train models against braking curve specifications. Initially, a database containing the National Values of European countries will be created for the tool to access in calculating the braking curve specifications. In this way, the interoperability between the respective countries for specific vehicle types can also be examined.