



ANALYSIS OF IMPACT THE PRESSURE ON THE RAIL VEHICLES AND PASSENGER DURING MOVEMENT

Student: Angelina SAVIĆ¹
Mentor: Jovan TANASKOVIĆ²

Abstract – The aim of this master's thesis is to provide a broader picture that refers to the impact of a sudden change in pressure during the movement of a rail vehicle on passengers, formwork and rail vehicle devices. The highest values of aerodynamic loads of the rail vehicle are achieved when entering and passing through the tunnel. When a train passes through a tunnel, pressure waves propagate along the tunnel at approximately the speed of sound. These pressure waves can penetrate inside the train if the vehicle is not adequately sealed and can cause discomfort to passengers on the train. To avoid negative effects, it is necessary to prevent a sudden change in pressure in the passenger compartment. Active protection means a closed circuit of the air conditioner where the ventilation is constantly on. On the other side, passive protection means closing the air conditioning system during the formation of shock waves, until a sudden change in pressure from the outside is overcome. With this closure, there is 100% air circulation inside the cabin, meaning there is no intake of fresh air. However, there is a problem with the accumulation of carbon dioxide in the cabin of the rail vehicle, over a long period of time overcoming the increase in pressure. The master's thesis deals with the occurrence and spread of pressure surges, the impact of pressure surges on the formwork of a rail vehicle and on a person. The results of the analysis show that the greatest influence on the pressure wave are cross-sections of the tunnel and the train, as well as the geometry of the tunnel portal and the vehicle speed itself. Based on the obtained results, it is possible to reduce the pressure by changing the geometry of the tunnel portal, as well as by increasing the cross-section of the tunnel, and by reducing the cross-section of the vehicle. Considering the respect of the dimensions of the vehicle, the first two options are resorted to. It is also possible to reduce the speed of the vehicle when entering the tunnel in order to reduce the pressure on the vehicle itself.

Keywords - Pressure waves, Tunnel, Passengers train, Formwork, Tightness.

¹ Faculty of Mechanical engineering, University of Belgrade, Serbia, angelinasavic.kv@gmail.com

² Faculty of Mechanical engineering, University of Belgrade, Serbia, jtanaskovic@mas.bg.ac.rs