

Application of fire and evacuation models in evaluation of fire safety in railway tunnels

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Abstract. The paper describes an application of numerical simulation of fire dynamics and evacuation of people in a tunnel. The software tool Fire Dynamics Simulator is used to simulate temperature resolution and development of smoke in a railway tunnel. Comparing to temperature curves which are usually used in the design stage results of the model show that the numerical model gives lower temperature of hot smoke layer. Outputs of the numerical simulation of fire also enable to improve models of evacuation of people during fires in tunnels. In the presented study the calculated high of smoke layer in the tunnel is in 10 min after the fire ignition lower than the level of 2.2 m which is considered as the maximal limit for safe evacuation. Simulation of the evacuation process in bigger scale together with fire dynamics can provide very valuable information about important security conditions like Available Safe Evacuation Time (ASET) vs Required Safe Evacuation Time (RSET). On given example in software EXODUS the paper summarizes selected results of evacuation model which should be in mind of a designer when preparing an evacuation plan.