



Rolling noise in road and rail transportation systems

Long term exposure to ground transportation (road and rail traffic) noise is, after air pollution, the main environment-related health stressor in densely populated areas and compromises the quality of life and, indirectly, the life expectations of millions of people. The main source of ground transportation noise at speeds up to 130 km/h in road traffic and up to 300 km/h in rail traffic is rolling noise; noise generated due to the interaction between tyre and road (respectively wheel and rail). Although at first sight noise generation in these two transportation systems might seem unrelated, exploring the common aspects provides valuable insight in current practices for the modeling, prediction and abatement of rolling noise. In this paper the sound and vibration generation mechanisms due to tyre/road and wheel/rail interaction are discussed, focusing on the similarities and differences between the sound and vibration generation mechanisms in these two systems. This perspective is further extended to the discussion of modelling strategies and source characterization methods, with a particular emphasis on the influence of surface roughness on contact force generation, and noise and vibration mitigation measures in both road and rail traffic systems.