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Air Quality Assessment for a Hot-Spot Station by Neural Network Modelling of the near-Traffic Emission-Immission Interaction

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Abstract : Urban air quality and climate protection are two major challenges for future mobility systems. Despite the steady reduction of pollutant emissions from vehicles over past decades, local immission load within cities partially still reaches heights, which are considered hazardous to human health. Although traffic-related emissions account for a major part of the overall urban pollution, modeling the exact interaction remains challenging. In this paper, a novel approach for the determination of the emission-immission interaction on the basis of neural network modeling for traffic induced NO2-immission load within a near-traffic hot-spot scenario is presented. In a detailed sensitivity analysis, the significance of relevant influencing variables on the prevailing NO2 concentration is initially analyzed. Based on this, the generation process of the model is described, in which not only environmental influences but also the vehicle fleet composition including its associated segment- and certification-specific real driving emission factors are derived and used as input quantities. The validity of this approach, which has been presented in the past, is re-examined in this paper using updated data on vehicle emissions and recent immission measurement data. Within the framework of a final scenario analysis, the future development of the immission load is forecast for different developments in the vehicle fleet composition. It is shown that immission levels of less than half of today's yearly average limit values are technically feasible in hot-spot situations.

Keywords : air quality, emission, emission-immission-interaction, immission, NO2, zero impact
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