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# MODELING INDOOR PARTICULATE MATTER USING A COMPREHENSIVE MATHEMATICAL MODEL.

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## EXTENDED ABSRACT

In several cases an indoor environment is not well mixed, and it cannot be treated as a single zone. In order to investigate the air quality in these cases the indoor environment has to be divided in independent, well mixed compartments communicating via air flow. A two-zone mathematical model has been developed in this work to investigate the mass concentration and the mass distribution of non chemically reactive pollutants in multizone indoor environments. The model is based in mass balance equations, applied in each zone. These equations are solved numerically with the Runge-Kutta method. Particle size distribution is calculated with the Log-Normal Size Distribution Function in respect to the particle diameter. The model is applied for Environmental Tobacco Smoke (ETS) in a two-zone indoor environment. The results of the model are compared with the results of an analytical model, applied for the same conditions and previously validated with experimental data. Four different scenarios related with the air exchange rate between the two zones and the outdoor environment and two different scenarios related with the emission rate are investigated. In all the scenarios particle mass concentration results are in agreement for the two models. The effect of exhaust ventilation in the removal of the pollutants has been demonstrated. Our model underestimates particle size distribution values for larger particles and overestimates particle numbers gathered in the area 0.1-0.3 μm. Further validation of the model is needed, but at its current stage it can be used to predict indoor mass concentrations in multizone environments.

**Key words**: Indoor modelling, Environmental Tobacco smoke