

Vehicular traffic and air pollution in metropolitan areas: a mathematical approach

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ABSTRACT

Nowadays, one of the great environmental challenges is to improve the quality of the air that the inhabitants of big cities breath. Leaving to one side fixed emissions due to industries, heating, etc., the main source of pollution in any metropolitan area is due to the vehicular traffic on its road network. Cars, in continuous motion, are a variable source of contamination (which depends simultaneously on position and time) making it difficult to establish a mathematical model to simulate the environmental pollution that they cause. In this paper, to simulate air quality in a big city, we propose to combine a 1D model to simulate density and traffic flow on a road network (see [1]), with a 2D air pollution model (see [2]), which includes a source term depending on the traffic flow on each avenue of the network. We detail a complete algorithm to solve the combined model and present some preliminary numerical results, obtained by applying this methodology to simulate the air quality in the metropolitan area of Guadalajara (Mexico).

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