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SIMULATION OF ATMOSPHERIC POLLUTANTS DISPERSION USING COMPUTATIONAL FLUID DYNAMICS

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Abstract. Air pollution is being a concern for a long time, not only for its impact on the environment, but mainly to human health. To solve this problem, it is important to reduce the release of air pollutants. To do so, we need to know how these pollutants disperse at the atmosphere. In large urban centers, vehicles are the main source of pollutants dispersion and, usually, the dispersion is disturbed due to the presence of big buildings. Currently, many tools to simulate air pollutants dispersion are available. Amongst them, the Computational Fluid Dynamics (CFD) stands out to micro-regions, such as one single street or block. In this way, this research aims to analyze the influence of pollutants emission speed over the plume behavior, simulating pollutants dispersion using the commercial software CFD ANSYS/Fluent™ 17.2. The geometry used in the simulation is quite simple, however it does not compromise the reliability of the results, as the studied phenomena has no influence of the obstacles in the surrounding area. The domain of study comprises basically five elements: ground, flare, roof, wind, and the domain itself. Before the analysis of emission speed influence over the plume behavior, the dispersion phenomenon was studied using the pressure, speed, concentration, density, and temperature profiles. The results showed that the emission speed is positively related to the height of the plume rise. As greater the emission speed of the pollutant gas, the higher the plume rise. Significant changes could be observed in wind flow patterns and pollutant concentration fields. In conclusion, the used methodology is appropriate to simulate air pollutants dispersion in micro-regions.