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Comparing CFD and Regulatory Modeling of Pollutant Dispersion Under Different Thermal Stabilities ALEC TAUER, TITO ONWUZURIKE, SOMESH ROY, Marquette University — Modeling pollutant dispersion in the atmospheric boundary layer is a complex task. Computationally efficient Gaussian plume-based dispersion models, such as AERMOD, are empirically formulated and validated for regulatory modeling in a wide range of meteorological conditions. On the other hand, CFD modeling – although more detailed and can potentially provide more accurate and predictive analysis – is not very common for atmospheric pollutant dispersion due to its computational cost. Large variations of meteorological conditions, high Reynolds numbers, large length scales and heat fluxes, and thermal plumes can make a rigorous CFD modeling of atmospheric dispersion computationally intractable. Also, limited detailed and high-resolution field measurements make high-fidelity validation of CFD modeling difficult. In this work, we present a comparison of CFD modeling with AERMOD calculations for pollutant dispersion in an idealized urban setting under various atmospheric stabilities as an indirect means for preliminary validation. In addition to pollutant concentration, derived atmospheric parameters, e.g., Monin-Obukhov length, are also compared by post-processing CFD results.

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