World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:18, No:04, 2024

Experimental and Computational Investigations on the Mitigation of Air Pollutants Using Pulsed Radio Waves

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Abstract : Particulate matter (PM) pollution in ambient air is a major environmental health risk factor contributing to disease and mortality worldwide. Current air pollution control methods have limitations in reducing real-world ambient PM levels. This study demonstrates the efficacy of using pulsed radio wave technology as a distinct approach to lower outdoor particulate pollution. Experimental data were compared with computational models to evaluate the efficiency of pulsed waves in coagulating and settling PM. Results showed 50%+ reductions in PM2.5 and PM10 concentrations at the city scale, with particle removal rates exceeding gravity settling by over 3X. Historical air quality data further validated the significant PM reductions achieved in test cases. Computational analyses revealed the underlying coagulation mechanisms induced by the pulsed waves, supporting the feasibility of this strategy for ambient particulate control. The pulsed electromagnetic technology displayed robustness in sustainably managing PM levels across diverse urban and industrial environments. Findings highlight the promise of this advanced approach as a next-generation solution to mitigate particulate air pollution and associated health burdens globally. The technology's scalability and energy efficiency can help address a key gap in current efforts to improve ambient air quality.

Keywords : particulate matter, mitigation technologies, clean air, ambient air pollution
Conference Title : ICUAPQE 2024 : International Conference on Urban Air Pollution, Quality and Environment
Conference Location : Boston, United States
Conference Dates : April 22-23, 2024