

Department of Manufacturing Engineering and Engineering Management

Seminar Series

A Simulation-Based Optimization of Downwind Drift during Aerial Sprays

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Date:	July 15, 2011 (Friday)
Time:	3:00pm <Tea Reception at 2:45pm>
Venue:	Room B6619, MEEM Conference Room

ABSTRACT

Minimization of the drift of aerially applied crop protection and production materials is studied using a novel simulation-based approach. First, this new approach studies many factors that can contribute to downwind deposition from aerial spray application to narrow down the major contributing factors using the Design of Experiments (DOE) method. With the focus on major contributing factors such as wind speed and droplet size, an optimization process is carried out in AGDISP and MATLAB. This results in a sub-optimal offset of the flight trajectory in the direction perpendicular to the swath lines to be used to compensate for the wind speed. The effect of the sub-optimal off-set, i.e., the swath displacement, is validated using Monte Carlo analysis: random values for all of the factors are generated; the sub-optimal swath displacement values are used in comparison to the default offset; the difference between the default and the sub-optimal offsets is analyzed. Statistical analysis of the results show that using the sub-optimal offset values can greatly reduce downwind drift as compared to the default offset value. In fact, the sub-optimal offset values achieve results that are very close to the

optimal ones. For comparison of the results, the application efficiency and the downwind depositions at different distances are used as the performance metrics. The new method can provide useful guidance to the applicators.

BIOGRAPHY

Dr. Wei Zhan is an Assistant Professor of Electronics Engineering Technology and Industrial Distribution at Texas A&M University. Dr. Zhan received his D.Sc. in Systems Science and Mathematics from Washington University in St. Louis, in 1991. From 1991 to 1995, he worked at University of California, San Diego and Wayne State University. From 1995 to 2006, he worked in the automotive industry as a system engineer. In 2006, he joined the Electronics Engineering Technology faculty at Texas A&M University. His research activities include control system theory and applications to industry, smart grid, system engineering, robust design, modeling, simulation, quality control, and optimization.

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All are welcome!