

Deriving Insect Population Characteristics from Trap Data

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Setting up traps is a common way of establishing the presence of a species of insects and its population density. Deriving estimates of population density from trap data typically requires knowledge of the properties of the trap, e.g. active area, strength of attraction, as well as some properties of the population, e.g. diffusion rate, [2]. These parameters are seldom exactly known, [1], and also tend to vary in time, e.g. as a result of changing climatic conditions. We propose using a set of traps in such a configuration that they have different rate of trapping the insects. The properties of the traps and the characteristics of the population, including its density, are simultaneously estimated from the streams of captured insects in these traps. The basic model is an advection-diffusion equation where the traps are represented via suitable advection term defined on the active area of the trap. The values of the unknown parameters of the model are derived by solving an optimization problem. The robustness of the method is demonstrated by numerical simulations.

References

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