Source and velocity recovery from one time measurements in the advection diffusion equation

Inferencia de parámetros en PDE's

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Advection diffusion equation

We can model the propagation of contaminants in a medium with the advection diffusion equation.

$$u_t(x,t) = \Delta u(x,t) + \psi \cdot \nabla u(x,t) + f(x)\,,$$

where

- $u(x,t)$: contaminant density
- ψ: constant velocity of the medium
- $f(x)$: contaminant source intensity in the position x

QUESTION: How many time measurements $u(\cdot, T_i)$ do we need to recover f and ψ uniquely?