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### Academy of Mathematics and Systems Science, CAS Colloquia & Seminars

**Speaker:** Assistant Professor Lingyun Qiu, Yau Mathematical Sciences Center, Tsinghua University**Inviter:** Associate Professor Chong Chen**Title:** Traceability of Water Pollution: An Inversion Scheme via Dynamic CGO Solutions**Language:** Chinese**Time & Venue:** 2023.04.20 10:00-11:00 Z311**Abstract:**

We aim to find the time-dependent source term in the diffusion equation from the boundary measurement, which allows for the possibility of tracing back the source of pollutants in the environment. Based on the idea of dynamic complex geometrical optics (CGO) solutions, we analyze a variational formulation of the inverse source problem and prove the uniqueness and stability result. A two-step reconstruction algorithm is proposed, which first recovers the locations of the point sources, and then the Fourier components of the emission concentration functions are reconstructed. Numerical experiments on simulated data are conducted. The results demonstrate that our proposed two-step reconstruction algorithm can reliably reconstruct multiple point sources and accurately reconstruct the emission concentration functions. In addition, we decompose the algorithm into two parts: online and offline computation, with most of the work done offline. This paves the way towards real-time traceability of pollution. The proposed method can be used in many fields, particularly those related to water pollution, to identify the source of a contaminant in the environment and can be a valuable tool in protecting the environment.

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