

PiAI Seminar Series: Physics informed AI in Plasma Science

5:00-6:00, 11 March 2024 (PDT)

8:00-9:00, 11 March 2024 (EDT)

13:00-14:00, 11 March 2024 (CET)

21:00-22:00, 11 March 2024 (JST)

Web Seminar

State and parameter estimation of low temperature plasmas using data assimilation

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Abstract

Data-driven models serve as a promising tool to accelerate the understanding of complex plasma physics and chemistry. Typically, experimental data are compared with the solutions of the physics-based models, serving as an offline validation technique. Another way to utilize data is an online validation approach in which the measurement data are coupled directly with theory, i.e., physics-based models. Such data assimilation techniques can account for time-varying (dynamic) data and models, enabling the estimation of states and parameters in space and time. In this talk, I will present the development of extended Kalman filter (EKF) that is coupled with a zero-dimensional (0D) plasma global model. We have demonstrated that the EKF can estimate rate coefficients, electron temperature, electron transport coefficients, and power input. In addition, I will present a state and parameter estimation technique for partially differential equations (PDEs).