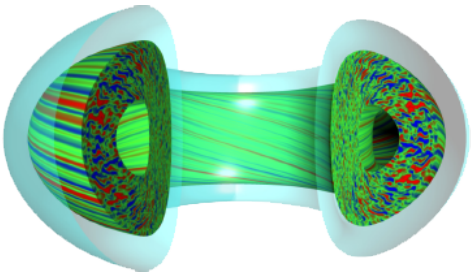

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RESEARCHES ON THE RECONSTRUCTION ALGORITHM OF ELECTRON DENSITY PROFILES BASED ON MACHINE LEARNING TECHNIQUES

Thursday, 2 December 2021 13:35 (10 minutes)

The measuring conditions in Magnetic Confinement Fusion (MCF) devices are complex. Original diagnostic data of interferometer systems could be unreliable due to electromagnetic interference, mechanical vibration, and hardware failures. Obtaining accurate density profiles, which are reconstructed without the influence of incorrect data, are beneficial to the reliable feedback control of density and the stable long-pulse operation of fusion devices. In this project, machine learning techniques are introduced into the reconstruction of electron density profiles using the diagnostic data from the interferometer systems in EAST tokamak. This new algorithm could identify and sort correct and incorrect data in millisecond. Then the electron density profiles are calculated using the correct interferometer data and magnetic surfaces data. In this profile reconstruction algorithm, accurate density profiles are calculated without the influence of incorrect data, which is beneficial for the control system to obtain accurate distribution information of electron density. Meanwhile, this algorithm is robustness to the vacancy values in the input dataset. After identifying and removing incorrect data, globally optimal solutions could be solved out using residual correct data. This algorithm has a good application prospect in fusion data processing, and can be employed in the profile reconstruction of other diagnostic systems, which measure the line-integrated parameters of plasma in fusion devices.

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