

Abstract Submitted
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**Real-time Equilibrium Reconstruction with Kinetic Constraints
on DIII-D**

¹ RICARDO SHOUSA, Princeton University, JOHN FERRON, General Atomics, ZICHUAN XING, OAK NELSON, Princeton University, KEITH ERICKSON, PPPL, EGEMEN KOLEMEN, Princeton University, DIII-D TEAM — Since not all quantities of interest in tokamak plasmas can be measured directly, real-time equilibrium reconstruction codes (rtEFIT [1]) are used. However, plasma internal profiles remain largely unconstrained when only data from magnetics are used. Therefore, it is crucial to include data from diagnostics that constrain profiles. Recently, real-time diagnostics that provide electron- and ion temperature- and density profiles have become available. An algorithm has been developed that fits pressure profiles using a modified hyperbolic tangent with linear core function. The contributions are summed and used to constrain the internal profiles. This algorithm was successfully tested during experiments. For the first time, the pressure pedestal was clearly identifiable and the reconstructed bootstrap current peak was consistent with expectations. The new version can generate a polynomial fit to the ratio of electron and ion temperature. This eliminates the risk of misalignment of the electron- and ion pressure pedestal. Furthermore, the algorithm can compute a fast ion pressure profile based on the electron pressure and injected beam power.

[1]: Ferron, J.R., et al, Nucl. Fus. 38(1998)1055

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