Transport analysis of EAST long-pulse H-mode discharge with Integrated Modeling

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In the 2016 EAST experimental campaign, a steady-state long-pulse H-mode discharge lasting longer than one minute has been obtained using only Radio Frequency heating and current drive, and the confinement quality is slightly better than standard H-mode, H_{98y2}~1.1, with stationary peaked electron temperature profiles. Integrated modeling of one long-pulse H-mode discharge has been performed with equilibrium code EFIT, and transport codes TGYRO and ONETWO under integrated modeling framework OMFIT. The plasma current is fully-noninductively driven with a combination of ~2.2MW LHW, ~0.3MW ECH and ~1.1MW ICRF. Time evolution of the predicted electron and ion temperature profiles through integrated modeling agree closely with that from measurements. The plasma current (Ip~0.45 MA) and electron density are kept constantly and the simulated plasma current density profile is compared with that constrained by far-infrared polarimeter/interferometer. A steady-state is achieved using integrated modeling, and the bootstrap current fraction is ~30%, the RF drive current is ~70%. Electron energy transport is shown to be dominated by turbulence transport. Transport analysis of the long-pulse H-mode experiments on EAST will be helpful to build future experiments, also increase our confidence for ITER and CFETR design and simulations.