

Hysteresis and Fast Timescale in Transport Relation of Toroidal Plasmas

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1. In addition to bifurcation in Improved Confinement, transport hysteresis in core plasmas is widely observed.
2. The core hysteresis involves two elements:
 1. Interaction at long distance
 2. Direct influence of heating on transport/fluctuations
3. A theory is developed to explain the process that ‘*The heating heats turbulence*’. It is attributed to a possible origin of hydrogen isotope effect on confinement time.
4. This hysteresis has the impact on the ‘time scale’ (at transition and back-transition) in the control system of fusion devices.

