# Sawtooth control using electron cyclotron current drive in ITER demonstration plasmas in DIII-D

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**Abstract.** Sawtooth control using electron cyclotron current drive (ECCD) has been demonstrated in ITER-like plasmas with a large fast ion fraction, wide $q = 1$ radius and long uncontrolled sawtooth period in DIII-D. The sawtooth period is minimised when the ECCD resonance is just inside the $q = 1$ surface. Active sawtooth control using driven current inside $q = 1$ avoids the triggering of performance-degrading neoclassical tearing modes, even at much higher pressure than required in the ITER baseline scenario. Operation at $\beta_N = 3$ without 3/2 or 2/1 neoclassical tearing modes has been achieved in ITER demonstration plasmas when sawtooth control is applied using only modest ECCD power. Numerical modelling suggests that the achieved driven current changes the local magnetic shear sufficiently to compensate for the stabilising influence of the energetic particles in the plasma core.

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