Improved break-in slope analysis for the estimation of power deposition profiles in JET

E. Lerche[(1)] and D. Van Eester[(1)]
[(1)] Laboratory for Plasma Physics-ERM/KMS, Brussels, Belgium

Most of today's tokamak experiments rely on auxiliary heating of the plasma for achieving reactor-relevant temperatures. On top of the theoretical efforts to estimate the power deposition profiles of the various adopted heating schemes (NBI, ICRH or ECRH) by numerical modelling, there are various techniques used to infer the power profiles experimentally, usually based on electron/ion temperature data. Among these methods, the break-in-slope (BIS) and the Fast Fourier Transform (FFT) analyses of the experimental temperature signals responding to a discontinuity of, or a modulation on the applied power have been systematically used in JET experiments in the last years. The FFT method requires a periodic modulation of the auxiliary power whereas the standard BIS has the advantage of needing only a single discontinuity of the auxiliary power level. In this work we present an improved BIS procedure, that not only autonomously captures the time delays between the power 'step' and the respective temperature 'breaks', but also extends the original linear fit of the temperature signals to an exponential one, trying to capture local saturation phenomena due to transport and losses. The results of the improved BIS analysis are compared to the FFT results for a series of JET experiments and the main advantages/restrictions of the two methods are discussed.