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Instabilities in magnetised plasma columns[1] BERNARD REMAN, GWENAEL FUBIANI, LAURENT GARRIGUES, GERJAN HAGELAAR, GREPHE/LAPLACE/CNRS, Université de Toulouse, Toulouse, France, ALAIN SIMONIN, IRFM, F-13108 St Paul lez Durance, France — In the International Thermonuclear Experimental Reactor, the two neutral-beam injectors (NBI) are designed to deliver a joint power of 33MW with 1MeV deuterium injection. The neutralisation of positively charged deuterium is inefficient at such energies which requires to generate, accelerate and neutralise negatively charged deuterium ions which is central for developing DEMO. The magnetised plasma column source is a serious candidate for the generation of negative ions [New J. Phys. **18** 125005(2016)] while the beam-driven plasma neutraliser concept has been proposed as a good trade-off between cost and yield [E. Surrey, AIP Conf. Proc. **1515** 532 (2013)]. These linear plasma devices are prone to instabilities in the plane perpendicular to the magnetic field which affects plasma transport and eventually their performance. We follow these instabilities by running particle-in-cell simulations [G. Fubiani et al., New J. Phys. **19**, 015002 (2017)] for magnetic fields values that span regimes in which the ions are either magnetised or unmagnetised together with its transition. We characterise them via Fourier analysis and compare the modes with a dedicated dispersion relation [S. Sadouni et al. APS Meeting Abstracts (2018)] that lead to the non linear regime.

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