AnaLYsis of the peeling-ballooning mode in globus-m2 [[1]](#footnote-1)\*)

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The Globus-M2 [1] edge plasma in a high-confinement regime exhibits the destabilisation of the peeling-ballooning mode of two types: synchronised and desynchronised with the internal reconnection onset. The initial analysis of the synchronisation between internal reconnections and edge-localised modes highlighted the importance of the external current perturbation in the vicinity of the separatrix and pedestal [2]. The success rate of the edge instability triggering depends on the current perturbation penetration depth, a function of the temperature and safety factor.

In this paper, we present the stability analysis of peeling-ballooning mode in Globus-M2 plasmas. The peeling-ballooning stability was investigated utilising 3D MHD code implemented in the BOUT++ framework [3]. The initial conditions for simulations correspond to experimental values of plasma current, Ip, below 500 kA and toroidal magnetic field, Bt, below 1 T. The major and minor radii of the Globus-M2 vacuum vessel are R=0.36 m and r=0.24 m, correspondingly. The electron density and temperature profiles were measured by the Thomson scattering diagnostic (TS) [4,5] with a 1 cm spatial resolution near separatrix.

According to the model [2], the preliminary analysis revealed the inverse dependency of the synchronisation rate on electron temperature and plasma current. The current perturbation depth is significantly limited with electron temperature at ψnorm=0.9 exceeding 300 eV and therefore does not lead to an edge-localised mode growth. However, the edge-localised mode requires the ballooning parameter to be higher than the critical value to trigger the onset without the current perturbation. Also, a subset of pulses demonstrating the transition to ELM-free H-mode [6] was investigated.

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