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MARFE stability analysis in ELMy H-mode NSTX plasmas[1]
FRED KELLY, Unaffiliated, RICARDO MAQUEDA, Nova Photonics, RAJESH MAINGI, Oak Ridge National Lab, NSTX TEAM — The temperature and density dependence of plasma and atomic processes have been previously identified as the cause of many abrupt transition phenomena in tokamaks, e.g. Multi-faceted Axisymmetric Radiation From the Edge (MARFE). In the National Spherical Torus Experiment (NSTX), edge-localized modes (ELMs) are observed using a fast-framing camera to interact with an inner-wall MARFE, leading to partial burn-through of the MARFE during the ELM cycle[1]. After the ELM pulse, the light pattern subsequently transitions from a helical pattern (a residual from the previous partially burned-through MARFE) to the classic MARFE axisymmetric pattern, with the cycle being repeated at each ELM. We use thermal instability theory to attempt an explanation of the MARFE/ELM dynamics in the NSTX. In particular a single discharge provides many examples of plasma profiles which are thermally stable, and also many profiles which are thermally unstable. Details of the analysis will be presented.
[1] R. Maqueda, e.t. al., this conference.

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