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Theory of nonperturbative frequency-sweeping modes RODDY VANN, University of York, U.K., HERB BERK, Institute for Fusion Studies, Austin, TX — Recent numerical studies have investigated the response of 1-D plasma with source and sink which, without a perturbation, would in steady state produce a highly unstable two stream configuration despite an additionally imposed linear damping term. Starting from this state, the system undergoes strong relaxation. Ultimately the system reaches a state far from the initial two stream configuration that exhibits bursting events which frequency up-shift only, initially linearly in time. This is in contrast to the well-understood up-down frequency-sweeping events of perturbative modes. We interpret these results as a system near marginal stability as given by the Penrose criterion. The maximum frequency reached appears close to the maximum that is allowed from free energy considerations: this large sweeping allows for the maintenance of a nearly steady state near the marginally stable configuration. It is expected that there is a universality to this nonperturbative response. For example there is a striking similarity between the frequency-sweeping pattern observed here and frequency-sweeping patterns observed on MAST.

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