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MINIMAL PHYSICAL MODEL FOR INTERACTION OF MHD INSTABILITY WITH PLASMA[1]

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Larger scale plasma instabilities not leading to an immediate termination of a discharge often result in periodic nonlinear perturbations of the plasma. A minimal possible physical model has been formulated [1] for description of the system with drive and relaxation processes which have very different time scales. The model is based on two equations: the first being responsible for the relaxation dynamics (MHD force balance) and the second for the drive (energy conservation). For a convenient mathematical analysis this model can be represented as an autonomous system of three parameter-dependent first order ordinary differential equations

$$\begin{cases} \dot{x} &= (z-1)y - \delta x, \\ \dot{y} &= x, \\ \dot{z} &= \eta(h - z - y^2 z) \end{cases} \tag{1}$$

where $\delta, \eta, h > 0$.

In this talk we analyze the local and global stability of the system in the neighbourhood of fixed points for different values of the parameters δ, η, h.

REFERENCES

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