modeling ballooning mode in linear system with conducting walls [[1]](#footnote-1)\*)

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Plasma confinement systems with axisymmetric linear design are the simplest way to magnetically confine plasma. Such systems are limited in stability by the presence of a magnetic well on the axis, which causes diamagnetic instability. One of the ways to suppress the transverse losses due to this instability is the vortex confinement regime [2]. In this regime, with the use of wall potentials, it is possible to create a vortex flow zone in the confinement region, in which the flute modes are non-linearly saturated. The papers [1-2] describe the effect of conductive ends on confinement in magnetic systems with low plasma pressure in electrostatic approximation. In this work, we generalize this idea on a case, where it possible to consider the effect of conducting walls on a system with a longitudinal current that perturbs the magnetic field.

In this work we present system of equations that generalizes the electrostatic model of [1] to the three-dimensional case, so that the diamagnetic instability is formed mainly by the longitudinal current, and plasma pressure remains insignificant. The model is based on the reduced MHD [3] and uses paraxial equilibrium, which allows considering various magnetic configurations. The procedure for averaging along the field line introduce not the entire plasma, but split it over several longitudinal components. This allows studying non-electrostatic ballooning perturbations, along with the effect of regimes with a free and conducting boundary on confinement, and also deriving a stability criterion.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Mu/ru/AN-Konstantinov.docx) [↑](#footnote-ref-1)