Evolution and generation global magnetic structures induced by planets in solar corona

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A problem of influence of planets on solar activity cycles reduce to calculation of tidal forces [1] and tidal height [2], notwithstanding what as against oceans on the Earth, oceans on the Sun is plasma. That is why the purpose of the present work was to describe influence of a planet on changes of parameters of a plasma layer under action of horizontal tidal forces. A system of eleven equations including the continuity, proton motion and local electron equilibrium equations in two directions and Maxwell equations of spherical plasma layer under the homogeneous temperature of components is presented. A periodical (semi-diurnal, diurnal and long) solution for perturbation induced by planets taking into account both the gravitational, electric and magnetic fields is examined. The analytical dependence of the proton velocity and concentration, electric and magnetic field and electron density in dependence from time and heliographic coordinates is derived. Because of the simplifying assumptions we receive analytical expressions, which allow any to carry out estimations of conditions of observation of the various Global 3D-structures. The naturally greatest interest is represented by conditions of observation of the resonant phenomena. Near the Sun there are no spherical hydrogenous plasma layers with temperature at which the resonance would be observed. In a solar corona it is necessary to take into account forces of viscosity. For definition of conditions of observation of a resonance in a solar corona it is necessary to us to take into account dependence of temperature, concentration of particles and Coulomb logarithm from distance up to the Sun. Choosing for an estimation these dependences in model Whang-Chang [3], conditions of observation of the resonant phenomena in hydrogenous plasma layers of a Solar corona are determined. The estimation of resonant distances make about $43.5R_{\odot}$ for semi-diurnal tide and $77R_{\odot}$ for diurnal tide in inviscid model. The account of viscosity displaces a resonant layer closer to the Sun. The estimation of resonant distances makes about $16.7R_{\odot}$ for semi-diurnal tide and $18.1R_{\odot}$ for diurnal tide.

References

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