TRIGGER MECHANISMS OF TORNADO-CYCLONE FAST GENERATION AND REPLENISHMENT

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There exist purely hydrodynamic models of tornado-cyclone, i.e. rotating thundercloud from which tornado funnels usually form. In particular, such tornado-cyclone model in quasi-stationary stage can be suggested basing on the analogy with anticyclonic lenses of more warm and salt water than in open ocean. In this case quasi solid-state tornado-cyclone rotation is supported by Archimedes and Coriolis forces balance in stably stratified atmosphere.

However, there are known super-fast (during about ten minutes) cases of forming tornado-cyclone and its further replenishment with ascending vortices of degasification nature which were described in D.V. Nalivkin monograph and were observed above Amur bay in 1997, on 20th of September near Vladivostok.

It is conveniently to use magneto-hydrodymamic analogy (MAHDA) between equations system of magneto-hydrodynamic configurations in controlled thermonuclear fusion for the pair magnetic field – electric current and the pair velocity - vorticity for steady currents of ideal incompressible fluid.

The first tornado-cyclone model of this type is based on algebraic solution of the Grad – Shafranov equation for tokamak with D-shaped section; and the second model is connection with more difficult problem solution, when one gives equations of toroidal magnetic surfaces accounting their weak corrugation modelling turbulent pulsations in tornado-cyclone. Using these magnetic surfaces equations, one can calculate magnetic field and electric current density distribution and then derive similar formulae of velocity and vorticity fields in tornado-cyclone according to MAHDA.

However, in central zone (the tor "hole") these tornado-cyclone models should be supplemented with some ascending column-like vortex with the current of Gromeko – Beltrami type and pressure equality on this vortex external border and tor internal one. In this ascending vortex of degasification nature the presence of hydrated cluster ions, which are effective condensation centers, provide (in fact, without Coriolis forces) fast generation of tornado cyclone from which classic tornado funnels can form. Therefore, such tornado-cyclone is a descendant thundercloud for ascending vortices and a parent one for tornado funnels appearing later.

For model construction of generating tornado funnels from such tornado-cyclone one should also account growing atmospheric electric field by 2 – 3 orders under a tornado-cyclone, which has been already researched in number of the present report authors works.