ASCENDING SWIRLING STREAMS: THEORY, EXPERIMENTS

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In recent years, a gas dynamic theory of ascending swirling flows has been created [1–7]. In this theory, for the first time in the world, scientifically sound answers have been obtained to all fundamental questions about such flows. First, to answer the following question: "Why is there a swirl of air in these streams, which in each Terrestrial hemisphere has its own unique direction of rotation: counterclockwise in the Northern hemisphere and clockwise in the Southern hemisphere?" The second question is: "What is the source of the kinetic energy of the rotational motion of the air in these streams, which in natural ascending swirling streams – in tornadoes and in tropical cyclones – has a sufficiently large value?" And the scientifically sound answers to these questions turned out to be a revelation for many researchers: the rotation of the Earth around its axis uniquely determines the direction of air rotation in natural ascending swirling currents. And it is also this movement of the Earth that is the only source of kinetic energy of the air currents rotating in them.

Experiments illustrating the developed theory have been conducted since the beginning of theoretical research in this area [7–9]. They investigated the creation of ascending swirling streams, and measured their velocity characteristics, but the visual results of all these experiments were not as clear as in the experiment currently being conducted in Snezhinsk under the leadership of V. G. Mazhitov. And this visibility is the main success of this experiment. In a vertically positioned pipe, a sufficiently powerful exhaust fan directs air from bottom to top and rotates clockwise when viewed from above. The fan not only directs the air, but also swirls the air suitable for it in a clockwise direction, sometimes up to the lower layers of air located at the bottom of the experimental installation. This effect of the fan on the air approaching it was eliminated by installing a horizontal partition with five circular holes on it below the fan. After that, the air in the pipe began to rotate counterclockwise in full accordance with the gas dynamic theory of ascending swirling flows and corresponding to similar flows observed in nature, located in the Northern Hemisphere. This experiment once again confirmed two important practical conclusions from the gas dynamic theory of ascending swirling flows. The first conclusion is that if you stop the vertical movement of the air, the rotation of the gas will stop. This is a direct indication of the possibility of using external energy investments to stop and destroy tropical cyclones. The second conclusion is that the corresponding purely technical work with such pipes will make it possible to obtain electrical energy, the source of which will be the rotation of the Earth around its axis.

References

1. **Bautin, S. P.** Tornado and Coriolis force [Text]. – Novosibirsk : Nauka Publ., 2008. – 80 p.
2. **Bautin, S. P.** Mathematical modeling of destructive atmospheric vortices [Text] / S. P. Bautin, A. G. Obukhov. – Novosibirsk : Nauka Publ., 2012. – 152 p.
3. **Bautin, S. P.** Destructive atmospheric vortices: theorems, calculations, experiments [Text] / S. P. Bautin, I. Yu. Krutova, A. G. Obukhov, K. V. Bautin. – Novosibirsk : Nauka; Yekaterinburg : USURT, 2013. – 216 p.
4. **Bautin, S. P.** Destructive atmospheric vortices and the rotation of the Earth around its axis [Text] / S. P. Bautin, S. L. Deryabin, I. Yu. Krutova, A. G. Obukhov. – Ekaterinburg : USURT, 2017. – 336 p.
5. **Bautin, S. P.** Analytical and numerical modeling of gas flows taking into account the effect of the Coriolis force [Text] / S. P. Bautin, I. Y. Krutova. – Ekaterinburg : USURT, 2019. – 182 p.
6. **Bautin, S. P.** Numerical modeling of three-dimensional unsteady flows of a compressible viscous heat-conducting gas [Text] / S. P. Bautin, A. G. Obukhov. – Ekaterinburg : USURT, 2020. – 287 p.
7. **Bautin, S. P.** Gas dynamic theory of ascending swirling flows [Text] / S. P. Bautin, I. Yu. Krutova, A. G. Obukhov. – Ekaterinburg : USURT, 2020. – 399 p.
8. **Bautin, K. V.** Experimental confirmation of the possibility of creating an air stream swirled by the Coriolis force [Text] / K. V. Bautin, S. P. Bautin, V. V. Makarov // Bulletin of USURT. – 2013. – No. 2 (18). – P. 27–33.
9. **Bautin, S. P.** Creation of an air stream swirled by the Coriolis force when using a two-meter-diameter pipe [Text] / S. P. Bautin, V. V. Makarov // Bulletin of USUPS. – 2016. – No. 4 (32). – P. 39–45.