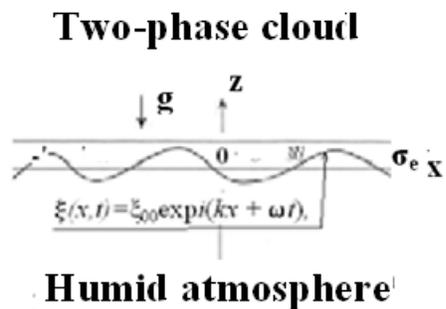


# ON THE INSTABILITY OF THE ELECTRICALLY CHARGED BOUNDARY BETWEEN A TWO-PHASE THUNDERCLOUD AND TURBULENT ATMOSPHERE AND THE POSSIBILITY OF A TORNADO TRUNK FORMATION

O. A. Sinkevich

*National Research University «Moscow Energy Power Engineering Institute», Joint Institute for High Temperature, e-mail: oleg.sinkevich@itf.mpei.ac.ru*

The stability of relatively small perturbations in the stationary state of a plane stationary interface between a two-phase thundercloud and a humid turbulent atmosphere (Fig. 1) has been analyzed with regard to medium viscosity. It has been indicated that two mechanisms could result in medium interface instability. The criteria characterizing the instability origination conditions have been obtained. It has been qualitatively indicated how the development of the instability could result in the formation of "a trunk" that forms a tornado funnel, if viscosity is taken into account. The obtained relationships make it possible to identify critical atmospheric conditions under which a tornado funnel can be formed [1 - 3]). The results can be used as an initial state in the numerical calculations of the flow characteristics within a tornado funnel and during laser and microwave sounding used to analyze an electromagnetic signal reflected from the mother cloud surface.



**Figure 1.** The horizontal boundary between a two-phase mother cloud and humid atmospheric air.

This work was partially supported by the Russian Foundation for Basic Research, project no. 15-08-05962.

## References

- [1] Sinkevich O.A. On the Instability of the Electrically Charged Boundary between a Two-Phase Thundercloud and Turbulent Atmosphere. Pleiades Publishing, Ltd High Temperature, 2016, Vol. 54, No. 6, pp. 775–781.
- [2] Sinkevich O.A. Model of Flow in the Tornado Funnel Including Phase Transitions. High Temperature, 1996, Vol. 34, No 6, pp.922 – 927.
- [3] Sinkevich O.A., Glazkov V.V., Smirnov E.P. Multiphase Energy and Mass Transfer in Atmosphere and Mechanism of Tornado Formation. Heat Transfer Research, 1996, Vol.27, No 1, pp.190-194.