1154-86-1323 **Andrei Bourchtein*** (`andburstein@gmail.com`) and **Ludmila Bourchtein** (`ludmila.bourchtein@gmail.com`). *On ellipticity of balance equations for atmospheric dynamics.*

The governing equations of atmospheric dynamics represent a system of time-dependent nonlinear partial differential equations (PDEs), which support both relatively slow dominant processes and fast gravity and acoustic waves of small amplitude. Solution of such a stiff system requires definition of initial conditions, which do not give rise to fast oscillations of large amplitude not observed in the real atmosphere.

To determine the required initial conditions, the balance relations in the form of nonlinear PDEs are imposed on the initial data for the atmospheric models. It is well known that some of these PDEs are non-elliptic which makes impossible formulation of well-posed boundary value problem. For example, the classic nonlinear balance equation is of the Monge-Ampere type and as such is non-elliptic for a given pressure function in the regions with anticylconic activity.

In this study, we derive ellipticity conditions for more complex differential systems of nonlinear adjustment and present a hierarchy of such conditions with respect to the complexity of the adjustment equations. Based on these results, we analyze a distribution of non-elliptic regions in the actual atmospheric fields for different forms of the balance equations. (Received September 14, 2019)