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Establishment of Perturbing Solar Streams Types by Neural Network Classification Method

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In work [1] types of perturbing streams from solar sources with use MHD modeling are established. For this purpose it is executed MHD modeling of 18 solitary large-scale events registered near the Earth, according to the description scheme developed in [2, 3]. In the present research on this material neural network classification of events on parameters of a solar wind and an interplanetary magnetic field which were analyzed earlier in task MHD modeling is executed. Thus the possibility neural network classification confirmation of MHD results is investigated.

Study is guided on an establishment of solar sources of the solitary large-scale disturbances. Among causes following types of appearances of solar activity have been assumed: flares (sf), coronal holes (CH), filaments (SDF), coronal mass ejections (CMEs), heliospheric current sheet (HCS) and their variety possible composite combinations. A result of classification by specially created self-learning neural network «Cohonen layer» became separation of the considered solitary events on 4 classes: intensive streams of sf-CH type (registered 22.03; 05.04; 13.08; 29.08.1979UT) and weak streams of sf-CH type (registered 09.01; 04.02; 18.09; 08.12.1979UT), middle intensive streams of CH-SDF and SDF type (registered 04.03; 21.04; 08.05; 18.05; 18.02.1979UT) and weak streams of CH-SDF and SDF type (registered 20.10; 28.10; 14.12; 03.09; 26.06.1979UT).

The neural network outcomes are satisfactorily adjusted with the conclusions which formulated earlier on the basis of MHD modeling. MHD modeling selected classes of sf-CH, CH-SDF, SDF streams also, but without separation on intensity. SDF class of neural network classifications was not allocated separately because the given type

of perturbing streams have weak intensity and in the present examination it has been referred to a dominating class of CH-SDF streams.

Thus, carried out neural network classification of the solitary large-scale disturbances registered near the Earth, confirms outcomes of the alternate MHD study. In addition it allows to draw a conclusion on intensity of the initial perturbing solar streams which generating large-scale disturbances in the solar wind.

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1. Barkhatov N.A., Zyryanova M.S., Ivanov K.G., Fridman V.M., Sheiner O.A. Identification of the Solar Sources of Geoeffective Disturbances Using MHD Modeling // Geomagnetism and Aeronomy, Vol. 42, No. 5, 2002, P. 564

2. Ivanov K.G. Solar Sources of the Interplanetary Plasma Streams in the Earth's Orbit // Geomagnetism and Aeronomy, Vol. 36, No. 2, 1996, P. 158

3. Ivanov K.G., Romashets E.P. Some Typical and Unusual Events of Solar-Terrestrial Physics in January-June 1999 // Geomagnetism and Aeronomy, Vol. 40, No. 5, 2000, P. 556