SPLINE FILTERING OF GEOMAGNETIC DATA

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A number of problems of digital filtering of the geomagnetic data in the case of non-uniform sampling, limited intervals of observations and significant non-stationaries caused by traditional filters are implemented with certain problems. Traditional filters are calculated for uniform sampling; unsteadiness cause dynamic errors; polynomial approximation filtering sometimes does not provide proper effectiveness due to possible high orders of the polynomials.

Digital filtering of the geomagnetic data with these features implemented on the basis of the method, based on the approximation spline functions (a.s.f.). For a finite time series of recordings of the geomagnetic field the spline nodes are assigned. The following functions and conditions are formed: 1. a.s.f. as a sum of basis spline functions and spline coefficients; 2. conditions of equality for zero and first derivatives of the spline functions, providing the smoothness in the nodes; 3. a functional as a sum of squares of differences between the a.s.f. and the geomagnetic time series. The functional is minimized according to the conditions of equalities. Optimal spline coefficients and the corresponding a.s.f. are calculated.

This approximation spline filtering was applied to the geomagnetic data with 1-second discretization. The results show the efficiency of the developed technique.