ACQUISITION OF SPATIAL HARMONICS FOR EDDY CURRENT TESTING OF CYLINDRICAL PRODUCTS

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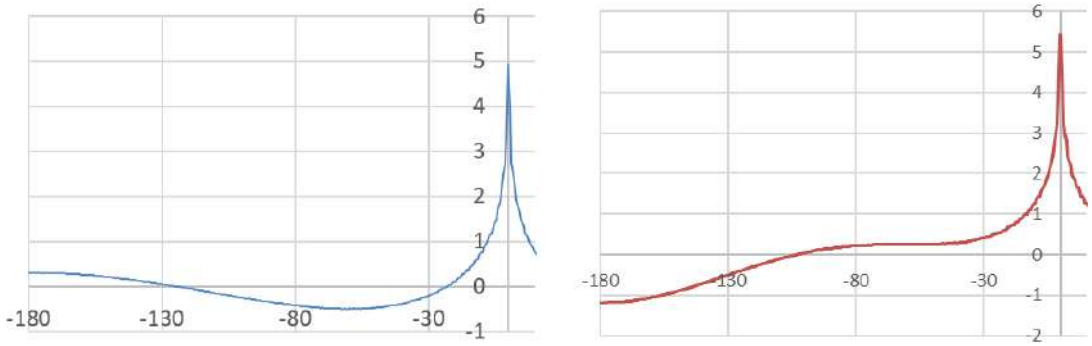
Currently, the priority task for research in the field of instrumentation is the creation of measuring transducers (sensors) which functioning is not simply based on fundamental physical principles, but also involves the use of the innovative methods and algorithms for processing signals of measurement information.

With the help of the eddy current measuring transducer described in [1] for a cylindrical metal object, its electrophysical parameters, namely, electrical conductivity and magnetic permeability, can be determined according to the developed algorithm. For this purpose, it should be separated spatial harmonics in the spatially periodic structure of the electromagnetic field. The parameters of these harmonics are determined by the mentioned electrophysical parameters of the cylindrical sample under study. This can be achieved by placing the measuring windings at such points in space cyllindric and their corresponding connection, so that the total of certain number of harmonics is zero (as it was illustrated in [1]).

It was shown in [2] that by placing the measuring windings along or perpendicular to the radius of the cylinder, it is possible to obtain the tangential and radial components of the electromagnetic field respectively. The distribution of these components in space can be represented mathematically in the form of series of orthogonal functions. In this report, it is considered on the example of the representation of one of the components of the electromagnetic field by a series of cosine components. Placing measuring winding at the points of the abscissa axis intersection of fig. 1, it is possible to obtain a signal formed by the first (a) and second (b) spatial harmonics.



а) б)

Fig. 1 – Placement of measuring winding for the selection of the first (a) and second (b) spatial harmonics

References:

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