

USING DISCRIMINANT FUNCTIONS TO IDENTIFY THE DEFECT TYPES OF OIL-FILLED EQUIPMENT

Kulyk O.S.

*National technical university
«Kharkiv polytechnic institute»,
Kharkiv*

Discriminant analysis is a section of multivariate statistical analysis that allows studying differences between two or more groups of objects on several variables simultaneously. Discriminant analysis is a general term referring to several closely related statistical procedures. These procedures can be divided into methods of intergroup differences interpretation (in other words, discrimination) and methods of classifying observations into groups. The main purpose of discrimination is to find a linear variable combination that best divides the considered groups.

Current international, national and departmental standards on the interpretation of the dissolved in oil gas analysis (DGA) for the recognition of the defect type in oil-filled equipment recommend the use of three criteria: the value of gas ratios, the value of gas percentage and the value of ratios of gas concentrations to the gas with maximum concentration. However, as shown in [1], using only one of these three criteria does not always make it possible to reliably recognize the defect type. To improve the recognition reliability, it is proposed to use the discriminant functions of the view:

$$f_i = \lambda_0 + \lambda_1 \cdot x_1 + \dots + \lambda_n \cdot x_n,$$

where i – the number of the equipment group with the defect type set;

n – the number of variables used to separate the groups under consideration;

λ_i – weighting factors the values of which are determined so that the value f_i takes the maximum values for equipment with this defect type;

x_n – a variable used to separate the groups under consideration. The criteria mentioned above are used as these variables.

The defect type of the equipment corresponds to the one for which the function value f_i takes the highest values compared to all other functions trained for other diagnoses. The analysis has shown that the use of these functions, provides a higher value of the reliability of the diagnoses, compared to traditional methods.

References:

1. Шутенко О. В. Распознавания типов дефектов маслonaполненного оборудования на основе использования дискриминантных функций / О. В. Шутенко, А. С. Кулик. // Інформаційні технології: наука, техніка, технологія, освіта, здоров'я: тези доповідей XXVII міжнародної науково-практичної конференції MicroCAD-2019, 15-17 травня 2019 р.: у 4 ч. Ч. II. / за ред. проф. Сокола Є.І. – 2019. – С. 189.