

1.3.78. TESTING OF PRODUCTS BY UNIDIRECTIONAL ANGLE EMA TRANSDUCER

Suchkov G.M., Kelin A.A., National Technical University “Kharkov Polytechnic Institute”, XXII “Certification body ASU”, Kharkov, Ukraine

Introduction. Being nowadays in use, the electromagnetic-acoustic (EMA) transducers (EMAT) with emitters and receivers in the form of “zigzag” type inductors, generally, have bidirectional directional diagram. It results in formation of coherent pulse disturbances which are difficult to tune out. Errors in products quality assessment occur, especially the ones limited in scales. It is reasonable to eliminate the mentioned factor by forming a unidirectional EMAT diagram [1].

It is possible to perform formation of a unidirectional directional diagram by sequential supply of EMAT inductor cells with high-frequency pulse of current with a temporary shift [2, 3].

For the purpose of selection of EMAT design specifications optimal correlation and temporary excitation responses, the modeling of an acoustic field forming in metal was performed. Thereby some of the approaches suggested by Shubaev S.N., Shkarlet U.M. and other specialists are used. Results of the modeling are shown on the figure given below.

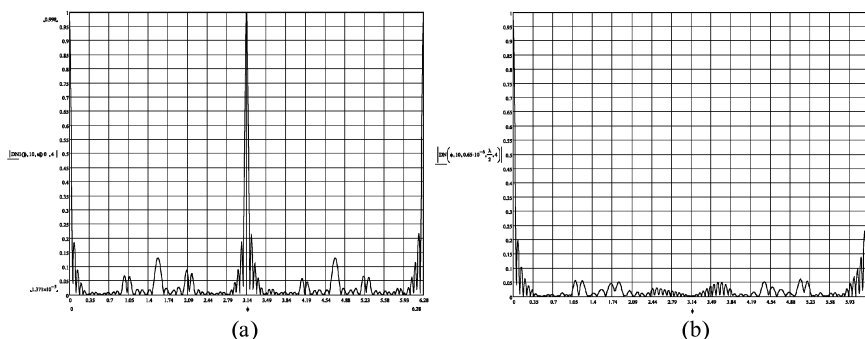


Fig. 1. EMAT directional diagrams with “zigzag” type inductors:

- (a) – with traditional current supply of all cells of a transducer simultaneously;
- (b) – with current supply of all cells of a transducer sequentially towards the acoustic field emission

Findings. Analysis of results achieved during the modeling process made it possible to confirm the possibility of a unidirectional acoustic field formation with minimal directional diagram lobes. At that, the existence of optimal temporary shifts for impulses supplying EMAT inductor cells was determined.

The possibility of formation of a directional diagram with a narrower opening of the latter in regards to EMAT of a traditional type.

It was shown that utilization of a unidirectional directional diagram allows to eliminate a possibility of coherent disturbances generation almost completely.

The achieved results are experimentally confirmed.

References:

1. **Неразрушающий** контроль: Справочник: В 8 т. / Под общ. ред. В.В. Клюева. Т. 3: Ультразвуковой контроль / И.Н. Ермолов, Ю.В. Ланге. – М.: Машиностроение, 2004. – 864 с.
2. **Сучков Г.М.** Современные возможности ЭМА дефектоскопии // Дефектоскопия. – 2005. – № 12. – С. 24 – 39.
3. **Сучков Г.М., Келин А.А.** Теоретическое обоснование построения однонаправленного электромагнитно-акустического преобразователя для возбуждения и приема волн Релея // Вісник Нац. техн. ун-ту «Харківський політехнічний інститут» – Харків: НТУ «ХПІ», 2008. – № 48. – С. 92 – 99.