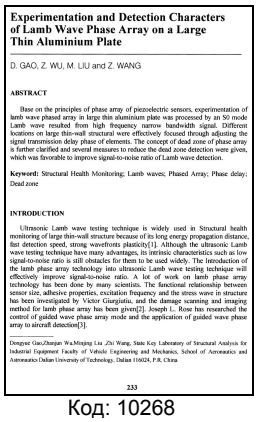

Experimentation and Detection Characters of Lamb Wave Phase Array on a Large Thin Aluminium Plate

D. GAO, Z. WU, M. LIU and Z. WANG

ABSTRACT

Base on the principles of phase array of piezoelectric sensors, experimentation of lamb wave phased array in large thin aluminium plate was processed by an S0 mode Lamb wave resulted from high frequency narrow bandwidth signal. Different locations on large thin-wall structural were effectively focused through adjusting the signal transmission delay phase of elements. The concept of dead zone of phase array is further clarified and several measures to reduce the dead zone detection were given, which was favorable to improve signal-to-noise ratio of Lamb wave detection.

Keyword: Structural Health Monitoring; Lamb waves; Phased Array; Phase delay; Dead zone

INTRODUCTION

Ultrasonic Lamb wave testing technique is widely used in Structural health monitoring of large thin-wall structure because of its long energy propagation distance, fast detection speed, strong wavefronts plasticity[1]. Although the ultrasonic Lamb wave testing technique have many advantages, its intrinsic characteristics such as low signal-to-noise ratio is still obstacles for them to be used widely. The introduction of the lamb phase array technology into ultrasonic Lamb wave testing technique will effectively improve signal-to-noise ratio. A lot of work on lamb phase array technology has been done by many scientists. The functional relationship between sensor size, adhesive properties, excitation frequency and the stress wave in structure has been investigated by Victor Giurgiutiu, and the damage scanning and imaging method for lamb phase array has been given[2]. Joseph L. Rose has researched the control of guided wave phase array mode and the application of guided wave phase array to aircraft detection[3].

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Ключевые слова:
Structural Health Monitoring, Lamb waves, Phased Array, Phase delay, Dead zone.

Содержание.