



On the development of marine seismic airgun array source signature model

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ABSTRACT

Seismic airgun arrays are the most widely used energy sources in marine seismic explorations. A detailed knowledge of the noise radiation from airgun array sources is essential for the array source modelling, design optimization and the post-processing of seismic signals for marine seismic explorations, as well as for assessing the consequent noise impact on marine fauna species as a result of the seismic explorations activities.

Starting from Gilemore's spherical bubble motion theory (Zolkowski, 1970), this paper reviews and discusses the state-of-the-art airgun array source signature model based on the physical process of airgun bubble oscillation behaviour, with considerations of effects from various physical factors. Subsequently, this study makes an attempt to develop an airgun array source signature model, with the relevant model parameters being optimised against signature outputs simulated using commercial airgun source modelling software package Gundalf™, through genetic algorithm optimization. Case studies concerning specific source array arrangements are presented to illustrate the level of accuracy and the limitations for the signature model developed for this study.