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Beam steering using 3-component data

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ABSTRACT

Conventional beam steering is a well known data analysis tool for scalar data. We have extended the method to accommodate vector data, and 3-component 1D, 2D, or 3D arrays. The dataset is decomposed into plane waves by summing along different wavefronts while combining the vector components to recover a particular wave type. Beam steering of 3-component data consists of two steps, a time shift and a vector transformation. In an isotropic subsurface only the vector transformation depends on direction, while in an anisotropic subsurface both the time shift and the vector transformation depend on it. The vector transformation additionally depends on whether the data were recorded on a free surface or within the medium. We show synthetic examples for the 3-component 1D, 2D and 3D array cases, compare them to their single-component counterparts, and give a real data example using a 1-D array of 3-component receivers.

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