DigiFIN™ – Next Wave of Streamer Control & Positioning

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Lateral towed streamer control and positioning

High-resolution seismic imaging requires a vessel to tow multiple streamers. The average number of streamers on modern 3-D vessels is approximately eight, though we've recently seen press coverage about contractor plans to introduce vessels with twenty or more streamers. As the number and length of streamer cables on each vessel increases, the imperative to maintain tight, uniform streamer positioning increases accordingly. In a perfect world, all the towed streamers would move through the water parallel to each other and in-line with the vessel. In addition, they would be towed as close together as possible to allow for finer sampling of seismic data and improved image quality.

Unfortunately, variable conditions within the marine acquisition environment -- such as current changes, winds, and vessel heading changes -- cause the streamers to feather and form asymmetrical (and sometimes erratic) shapes. Because of this uncontrolled movement, the distance between streamers is set more by the risk of tangling the streamers, than by any geophysical justification (note Figure 1). In essence, the cross-line bin size, and the quality of the final image, is determined by limitations of the marine acquisition equipment rather than by the objectives of the imaging program itself.

Much has been said about the advent of lateral streamer control and positioning. While this technology offers solutions to today's seismic acquisition difficulties, including erratic streamer shapes and cross-line bin asymmetry, it has been offered to date only by a single contractor who bundles their technology with services related to acquiring and processing the seismic data.

DigiFIN: the perfect complement for the multi-streamer vessel

Figure 1

By combining its market-leading capabilities in streamer acoustic and positioning technology, ION has developed a lateral streamer control system that overcomes today's acquisition constraints. Known as DigiFIN (as illustrated in Figure 1), the DigiFIN system stabilizes the streamer spread, which results in more symmetric and repeatable coverage patterns. Attaching DigiFIN to existing streamers with frequency-shift keying (FSK) compatible telemetry will lower in-fill rates and reduce the guessing game of predicting tides and currents.

With this level of control, more streamers can be towed much closer together (as illustrated in Figure 2) and without the risk of entanglement, allowing the objectives of the imaging program (rather than equipment constraints) to dictate the optimal streamer separation. By using DigiFIN on their vessels, marine acquisition contractors are able to improve the available cross-line resolution and deliver higher resolution seismic data to their customers. DigiFIN is designed to work in conjunction with ION's DigiRANGE II™ acoustic system, which provides enhanced streamer positioning information and allows more precise steering and streamer separation control.

Tomorrow's challenges introduce a whole new set of obstacles such as non-repeatability of receiver locations, streamer feathering control, difficulty acquiring data around obstructions, and accelerated spread stability after a line change. These issues – either separately or in combination – hamper accurate imaging of the subsurface.

Future capabilities of DigiFIN should encompass streamer feathering correction by 2-3 degrees, the ability to acquire data around obstructions (such as platforms) without taking unnecessary risks, and improved repeatability of receiver locations for 4D.

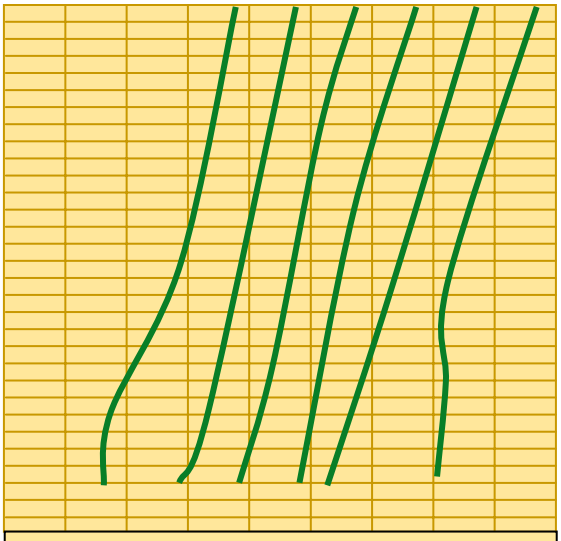

Figure 2a –
without DigiFIN spread stabilization
Feathered streamers with erratic shapes and cross-line bin size of ~ 50 meters

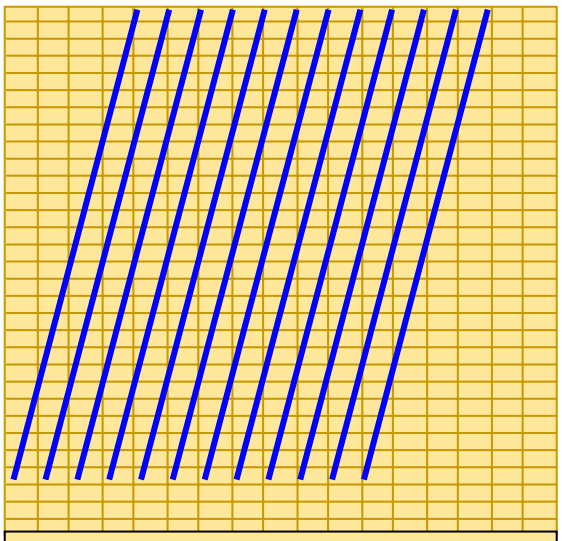

Figure 2b –
with DigiFIN spread stabilization
Feathered streamers with symmetric shapes and cross-line bin size of ~ 25 meters

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