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Measurement of angular power profile at an array receiver in a shallow underwater acoustic channel

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In the design of broadband underwater acoustic communication system, proper analysis of underwater acoustic channel characteristics is required to determine communication system parameters. Especially for high channel capacity transmissions such as multi-input multi-output (MIMO) systems, the spatial correlation characteristics among multiple sensors determine communication performance and they are affected by the angular power distribution of the incoming acoustic waves. In this study, we suggest a model-based array signal processing technique for measuring the angular power profile and apply it to experimental data gathered from very shallow water of 20 to 30 meters water depth near the southern coast of South Korea. At first we show the variation of the angular power profile over different transmitter/receiver ranges and then its impact on the spatial correlation characteristics between two different array elements. Finally we discuss the expected spatial diversity effects from the viewpoint of underwater acoustic channel modeling.