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Performance analysis of GARCH based DOA estimation in SONAR

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In this paper we propose a new source localization method using additive noise modeling based on Generalized Autoregressive Conditional Heteroscedasticity (GARCH) time-series. In an actual application such as underwater acoustics, the measurement of additive noise in a natural environment shows that noise can sometimes be significantly non-Gaussian and nonstationary, and therefore, signal processing algorithms that are optimized for Gaussian noise, may degrade significantly in this environment. GARCH models are feasible for heavy tailed PDFs and time varying variances of stochastic process and also has flexible forms. We use a more realistic GARCH(1,1) based noise model in the Maximum Likelihood Approach for the estimation of Direction-Of-Arrivals (DOAs) of impinging sources. In the performance analysis of the method, we examine the suitability of the proposed method in a passive sonar using simulation methods with cramer-rao bound (CRB) and perturbaion appraoch such as gain, phase and sensors positions errors.