

ACOUSTICS2008/281 "Venus's-noisetrap" high-gain adaptive processor

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The Venus's-noisetrap is a high gain adaptive signal processor inspired by Venus's-flytrap, an insect eating plant. The Venus's-noisetrap utilizes single sensor or beamformed spectral data. It "traps" the data samples by modifying the governing equations in a manner that each spectral sample is adaptively "trapped" before averaging. The trapping process is a fluctuation-based temporal coherence determination of whether the time history in each spatial or spectral bin is signal or noise. Signals are set "free", while the noise remains trapped, blocking it from participating in the averaging process. For ocean acoustic data, the processor automatically identifies signals from submerged sources. In addition, the Venus's-noisetrap achieves large signal-to-noise ratio (SNR), high spectral and spatial resolution, and auto-identification of signals. The techniques that cause this processor to mimic the Venus's-flytrap will be discussed, and the method of continuously adapting the governing equations to the unpredictable signal and noise environment will be illustrated. Results will be presented to show the processor's large SNRs and corresponding enhancements in spectral and spatial resolution.