TRANSIENT RADAR FOR TARGET IDENTIFICATION AND DETECTION

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A radar system using narrow interrogating EM pulses can provide capabilities of target identification and detection. When a target is illuminated by a narrow EM pulse, the scattered response from the target consists of an early-time response and a late-time response. The late-time response has been utilized to discriminate and identify the target based on the E-pulse (Extinction-pulse) and the S-pulse (Single-mode extraction pulse) techniques. These techniques are aspect-independent and their basic principles have been developed at Michigan State University. Our present effort on these techniques is to study the effectiveness of these techniques in the presence of sea clutter and noise.

We have initiated a study on the utilization of the early-time response of the target for target identification. The early-time response of a target consists of a series of sharp peaks representing specular reflections from discontinuities of the target structure. The locations and amplitudes of these peaks can be determined from the measured early-time response through a theoretical technique. The target is then identified by correlating its early-time response with that stored for a group of targets for various aspect angles. This procedure necessitates the storage of vast amounts of data. We have developed a method for reducing the amount of stored data based on the observed behavior of the early-time response. The scheme of using the early-time response has an advantage of high energy content but a disadvantage of aspect dependency leading to the need for predetermining the target's aspect angle.

We have also initiated a study to develop effective schemes to enhance the target response without increasing the noise and clutter levels for the purpose of target detection using narrow EM pulses. Possible schemes include the waveform shaping of interrogating pulses and coherent response processing utilizing the relative motion of the target against the background.