ASPECT ANGLE SENSITIVITY OF ULTRAWIDE BAND TARGET SCATTERING DATA

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Ultrawide band radar holds the promise of improved target detection as well as target identification. Much of this promise resides in the ability of the radar to exploit certain characteristics of the target scattering response.

In the case of target identification, differences in the received response due to target-to-target variations are used to make decisions. Recently, the early-time portion of the received response has been used in target identification. This portion of the response is composed of specular reflections from various parts of the aircraft fuselage, wings and engines. It provides a received signal that varies greatly from one target to another. Unfortunately, the signal also varies greatly depending on the aspect angle for a given target. The late-time portion of the response has also been used in target identification. The late-time has characteristic mode frequencies that are independent of aspect angle but amplitudes and phases that are aspect dependent. Thus, to assess the robustness of target identification methods, the variation of the received response with aspect angle must be investigated.

Recent improvements to the Michigan State University transient scattering range allow calibrated measurement of the scattering properties of scale model targets over the frequency range 0.2 to 18 GHz for all linear polarization combinations (hh, hv, vh, vv). Further, using a computer controlled rotation platform, the target aspect angle can be varied by as little as 0.15° between 0 and 360°. This measurement system is used to obtain data that is representative of both the early-time specular response as well as the late-time resonance response of the target models. Measured data from several scale model aircraft will be presented. The aspect angle sensitivity of the data will be examined for both the early-time and late-time. The possible impact of the aspect variations on target identification methods will be discussed.