

# **ACTIVE RETRODIRECTIVE ARRAY FOR MICROWAVE POWER TRANSMISSION**



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## **ABSTRACT**

An active retrodirective array (ARA) is a phased antenna array in which retrodirectivity of the transmitted beam is produced by electronically conjugating the phase of the pilot signal received by each element of the ARA. ARA's can be easily modified to function as receiving, as well as transmitting, arrays. Due to their inherent failsafe characteristics, ARA's are particularly attractive for microwave power transmission from solar power satellites. Communication satellites and deep space probes are other possible applications.

The "Central phasing" principle, in itself a simple generalization of the phase conjugation principle, avoids the need for structural rigidity implicit in conventional phase reference distribution systems. We describe a phase reference "tree" for implementing central phasing in very large ARA's, as well as a new kind of "exact" frequency translating phase conjugator which provides both input-output isolation and freedom from squint. The effects of doppler, aberration, impedance mismatches and multipath are discussed. We report on the performance of an experimental two element ARA, and on the design of an eight element ARA now being built at JPL.