
**Abstract**

This note presents a detailed mathematical analysis of a multiple-antenna AMTI radar system capable of detecting moving targets over a significantly wider velocity range than is achievable with a single-antenna system. The general system configuration and signaling strategy is defined, and relationships among system and signalling parameters are investigated. A deterministic model for the target return and a statistical model for the clutter and noise returns are obtained, and an optimum processor for target detection is derived. A performance measure applicable to a large class of processors, including the optimum processor, is defined and some of its analytical properties investigated. It is shown that an easily implementable sub-optimum processor are studied and a detailed numerical investigation of system performance is presented, including a study of how performance varies with basic system parameters such as the number of antennas.