The research of applying a dynamic adaptive estimator for radar target tracking systems

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ABSTRACT

ABSTRACT In view of the lack of dynamicity in a traditional fixed sensor system, an algorithm for tracking multiple maneuvering targets in a dynamic sensor system is proposed in this dissertation. The algorithm combines coordinate conversion logics and a multiple sensor data fusion for it to work in the dynamic sensor system. With the developed algorithm, the sensors can be installed in fixed or moving systems, which will improve the tracking accuracy and reliability of radar surveillance. Moreover, in order to overcome the problems inherent in a complex situation caused by tracking multiple maneuvering targets and to relieve the load of data association, a computation logic, including gating 1-step conditional maximum likelihood and a variable structure model as an adaptive maneuvering compensator, are applied to simultaneously solve both problems of data association and target maneuvering. In order to improve the system performance, another algorithm denoted Competitive Hopfield Neural Network (CHNN) is applied to our tracking system. In order to verify this approach, simulations of multi-target tracking problems are conducted. Computer simulation results indicate that this approach successfully tracks multiple targets in a dynamic sensor system and has good performance. Keywords: dynamic sensor system, multiple sensor data fusion, gating, 1-step conditional maximum likelihood, Competitive Hopfield Neural Network, adaptive maneuvering compensator.

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