The Research of Applying Optimal Estimation Theory to Radar Tracking Systems

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ABSTRACT

In a radar system, the tracking accuracy plays very important role even in a complicated environment. The key techniques for improving the tracking accuracy include data association and maneuvering estimation algorithm. When target maneuvering movement is occurred, the measurement error will increase. Therefore, it is important to design a new structure for the radar systems to enhance the system performance. In order to exact tracking targets, maneuver detection and acceleration estimation algorithm are applied to modify the parameters of the tracking filter. The adaptive multiple model estimators that the dissertation presented can solve the target maneuver problem. Moreover, the data association technique is not only applied to associate measurement with the predict target but also reduced the tracking error. In this dissertation, a competitive Hopfield neural network (CHNN) algorithm is proposed to improve the tracking capability. With the developed algorithm, the optimal estimation theorem is applied to improve the tracking accuracy and reliability of radar surveillance. By this way, we can diminish the errors resulted from producing maneuvering targets, then, the systems will get the better tracking results.

Keywords : Maneuver detection and acceleration estimation algorithm、data association technique、optimal estimation theorem

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