Path planning of UAV based on fluid computing via accelerated method

ABSTRACT

This paper presents our study on the method for planning the path for low-flying unmanned aerial vehicle (UAV) in complex terrain based on the theory of fluid flow. First, the 2D terrain map is generated using hill algorithm. Then the fluid field distribution is computed using fluid mechanics to establish streamlines in the field. These streamlines are then used as flight paths for UAV. In fluid mechanics, Laplace's equation is used as the controlling equation of the potential flow. The solutions of Laplace's equation can be solved using finite difference method. Existing methods are slow in computing the solutions for generating UAVs flight path. Hence, they are not suitable for real-time processing. In this paper, an efficient iterative method namely Two-Parameter Overrelaxation (TOR) method that employ an acceleration parameter is proposed. The efficiency of this approach is shown by comparing its performance with the previous methods. It was shown that the proposed TOR method outperformed the previous methods.