Unmanned Aircraft Automatic Flight Control Algorithm in an Immelmann Turn Maneuver

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The article presents an idea of automatic control algorithms dedicated to both small manned and unmanned aircraft, capable to perform Immelmann turn maneuver automatically. This is a case of maneuver far beyond a so-called standard flight. The character of this maneuver and the range of aircraft flight parameters changes restrict application of standard control algorithms. Often the possibility of complete information about aircraft flight parameters acquisition is limited as well in such cases. The paper analyses an alternative solution that can be applied in some specific cases.

The paper used theoretical discussion and breakdowns to create basics for creation of structures of control algorithms. Simplified analytical approach was applied to tune regulators. Research results were verified in the series of computer based, software-in-the loop, rig tests computer simulations.

The structure of the control system enabling aerobatic flight (Immelmann turn flight as example applied) was found and the method how to tune regulators was created as well.

Could be a fundament for autopilots working in non-conventional flight states and automatic aircraft recovery systems.

The paper presents author's original approach to aircraft automatic control when high control precision is not the priority and not all flight parameters can be precisely measured.