FULL ARTICLES

1. Akihiro MOTODANI and Noboru TAKEICHI: Feasibility Study on Modeling of Flight Time Prediction Uncertainty using Flight and Meteorological Conditions. Vol. 66, No. 5, pp. 123–127 (Oct. 2018) A precise flight time uncertainty prediction is expected to enable a more efficient air traffic management. According to an uncertainty propagation equation derived from a physical model, the flight time uncertainty increases as a function of ground speed and the variances of true air speed and head wind speed. These factors also depend on the flight and meteorological conditions. It is expected possible to improve the uncertainty prediction accuracy by appropriately taking these factors into its modeling. Through the clustering analysis of the actual flight and weather forecast data, the feasibility of the flight time uncertainty modeling using the flight speed and weather forecast information is clearly demonstrated. (DOI:10.2322/jjsass.66.123)

2. Kuniyoshi TABATA, Florian NGUYEN, Yuki HARADA, Masafumi FUKUNARI, Kaoru KAKINUMA, Kimita KOMURASAKI, Yusuke NAKAMURA and Hiroyuki KOIZUMI: Numerical Calculation on Air-Inlet Design of Microwave Rocket. Vol. 66, No. 5, pp. 128–134 (Oct. 2018) Air-inlet design and resulting thrust performance of Microwave Rocket at 10 km altitude and a flight Mach number of 2 were computed using CFD and the influence of plenum area size was examined. The results showed that, the partial filling rate was found to monotonically increase with the area ratio of plenum to thrust tube, though aerodynamic drag was increased with the ratio. Optimum area ratio was found about 1.0, and 85% of the maximum thrust was obtained when the range was between 0.60 and 2.0. (DOI:10.2322/jjsass.66.128)

3. Nanaka AGA and Nobuhiro YOKOYAMA: Inference of Flight Intent in Three-Dimensional Space Based on Inverse Optimal Control. Vol. 66, No. 5, pp. 135–142 (Oct. 2018) In order to cope with the rapid increase in global air traffic volume, it is necessary to significantly upgrade the technologies for conflict detection and resolution (CDR). For improving the accuracy of the trajectory prediction that is critical to CDR, we propose a method for flight intent inference of aircraft, which is an extension of the existing method to the flight in three-dimensional space. By solving the inverse problem of optimal control based on three-dimensional trajectory of aircraft, the method infers the flight intent of the aircraft including that of horizontal and/or vertical conflict resolution. The effectiveness of the method as well as the feasibility in real-time applications is demonstrated through numerical examples. (DOI:10.2322/jjsass.66.135)

RESEARCH NOTE

1. Hirotaka FUCHIGAMI, Masatoshi CHONO and Naoji YAMAMOTO: Prediction of Discharge Current using Neural Network in Hall Thruster. Vol. 66, No. 5, pp. 143–145 (Oct. 2018) We have been developing a prediction code of discharge current using neural network for constructing auto-controlling system in Hall thrusters. The neural network is feedforward neural network, which consists of 5 layers with 100 neurons. We adopted backpropagation method to the network and updated weights by AdaGrad. We used training 25500 data sets that consists of operation condition (inner and outer coil current, xenon mass flow rate, discharge voltage and time) and discharge current. The code could predict unknown discharge current history within relative error 1% with three days. The relative error with 2250 training data sets remains less than 1% within eight hours calculation on a standard PC. Considering actual operation, it is necessary to make learning speed up. (DOI:10.2322/jjsass.66.143)