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Author: Mr. elayaperumal ezhilrajan
Indian Space Research Organization (ISRO), India

INTELLIGENT FLOW PROCESSING SYSTEM FOR HIGH THRUST ENGINES FOR MIXTURE
RATIO CONTROL**Abstract**

The recent trends in launch vehicle scenario are the development of High Thrust Booster engines which can able to carry heavy satellite payloads. This leads to a higher propellant flow to the engines. This necessitate heavy size flow meter and complicated structure to mount in the launch vehicle stage. This would increase the mass and decrease in the Satellite pay load. It is better if the presence of flow meters in the stage can be avoided and Mixture Ratio(MR) of the engine would be controlled by alternative way. Modern trends in the technology development envisage that the usage of intelligence techniques via Artificial Intelligence, Neuro fuzzy logic and Machine learning solve the complex problems because it is well proven that these kinds of problems can be solved by intelligence methods. There is a novel idea that using the Artificial Intelligence techniques like neuro fuzzy, without flow meter and by using ground data set as a knowledge base for Intelligent System, a neurofuzzy model shall be developed. The objectives of the model would be: • For the High Thrust Booster engine, Design and development of Fuzzy Controller which is embedded with Intelligence algorithms using Neuro fuzzy techniques to determine propellant flow without flow measurements. • Model should give flow with prescribed accuracy during mission in real time for controlling MR. A neuro-fuzzy model has been developed using ANFIS tools. This estimates flow from the related propulsion parameters like Turbopump speed, Injection Pressure and Pump delivery pressure. Many parameters are measured during the flight. For selecting equivalent and more suitable propulsion parameters, a Bayes Model is developed because Bayes theorem describes the probability of an event based on the previous knowledge of conditions which is related to the event. By using the parameters and Ground engine hot test data, Neuro Fuzzy Model to predict flow data has been conceived. Neural net work is trained with proper data and the simulation model is generated through Matlab – SIMULINK. The simulation results are been achieved within accuracy of one percentage during engine steady state operations and within two percentage during start and shutdown operations.