

# Aircraft Jet Engine Exhaust Nozzle Controller Based on Turbine Pressure Ratio Sensor with Micro-Jet System

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*Abstract*— This paper deals with an aircraft jet-engine exhaust nozzle controller, based on a mixed constructive scheme: a hydraulic actuator and a turbine pressure ratio sensor as pneumatic command block. The pressure sensor works as pressure ratio transducer with a pressure feed-back, represented by a micro-jet; with an appropriate constructive modification and setup, it can operate without or with correction factor (with respect to the compressor pressure ratio). One has determined the system non-linear motion equations, which represents the non-linear mathematical model; these equations were issued for two distinct situations, with respect to the pressure sensor's drossels air flow regime through the pressure ratio sensor chambers (subsonic flow, respectively sonic flow). The non-linear model was transformed into a linear one, as well as into a non-dimensional one, using the finite differences method, respectively the Laplace transformation. Block diagrams with transfer functions were built, based on the linear non-dimensional mathematical model, for both the above-mentioned operating possibilities. In order to establish the system quality, one has performed some simulation and has estimate system step responses for different operating situations. Paper's content, conclusions and observations can be used for further studies, such as studies concerning aircraft jet engines with variable area exhaust nozzles, without or with afterburning.