











fuzzy logic algorithms can be applied in developing flight simulators for all types of aircraft and be acceptable for aircraft modeling and identification based on the known flight tests data.

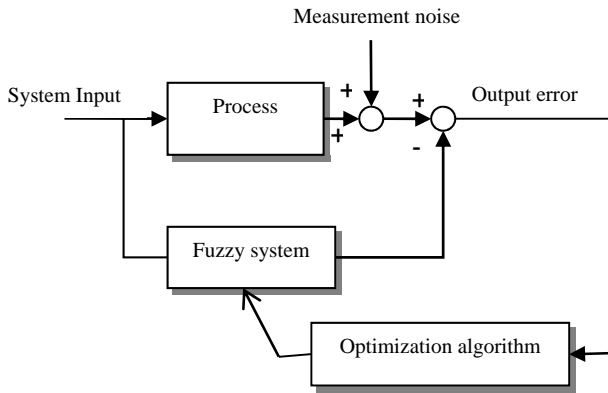


Fig.1 Basic scheme of the identification model for the nonlinear dynamic system using fuzzy logic algorithms.

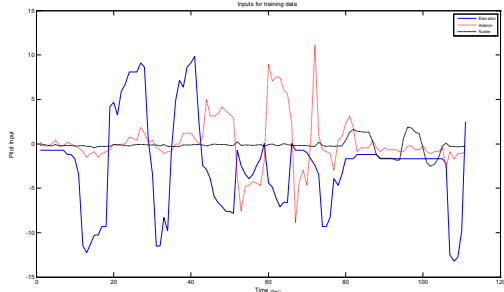


Fig.2. Three-channel series multistep input for training experimental flight test data

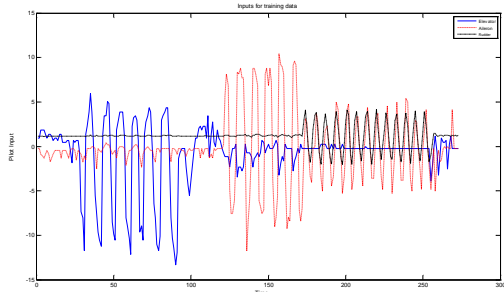


Fig.3. Three-channel series sinusoidal input for training experimental flight test data

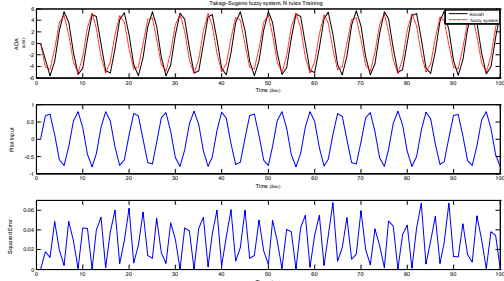


Fig.4. Training results of the AOA for simulation data with sinusoidal input

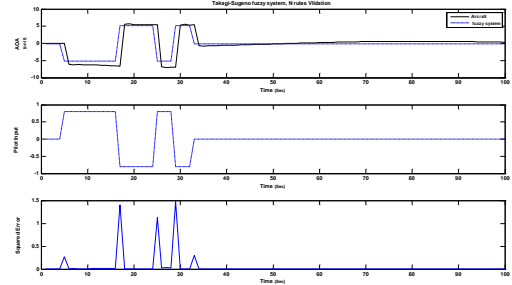


Fig.5. Training results of the AOA for simulation data with multistep input

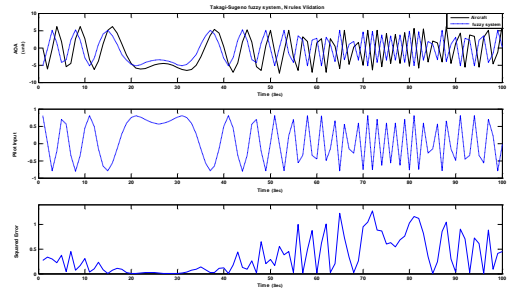


Fig.6. Validating results of the AOA for simulation data

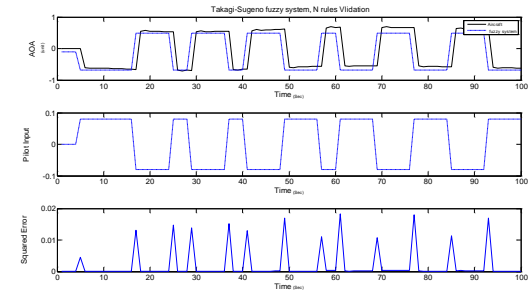


Fig.7. Validating results of the AOA for simulation data

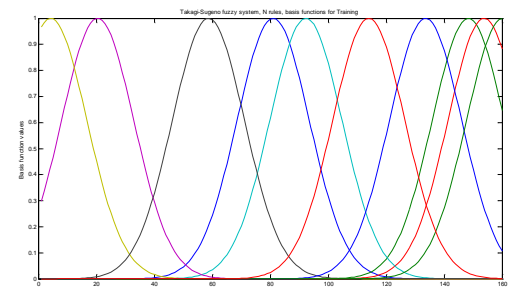


Fig.8. Membership functions activity for AOA in Takagi-Sugino fuzzy system

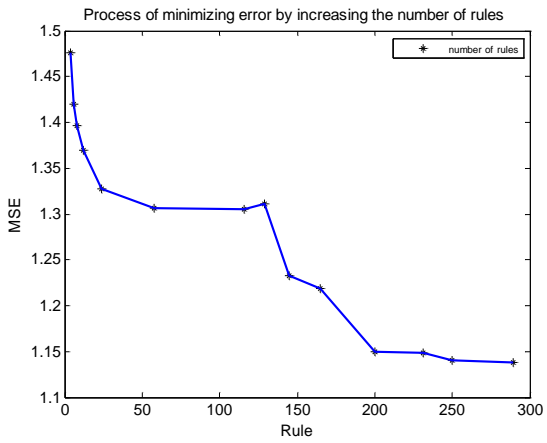


Fig.9. Process of minimizing error by increasing the number of rules for AOA in Takagi-Sugeno fuzzy system

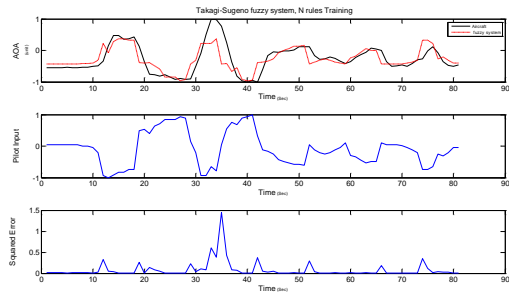


Fig.10. Results of aircraft AOA experimental data training by elevator input in Takagi-Sugeno fuzzy system with multistep signal

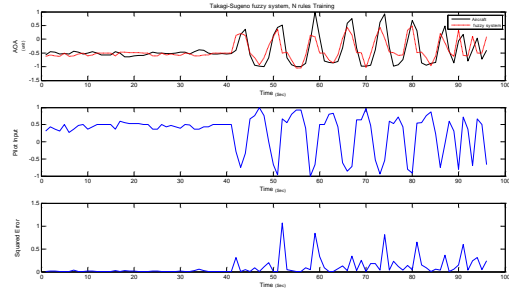


Fig.11. Results of aircraft AOA experimental data training by elevator input in Takagi-Sugeno fuzzy system with multistep signal

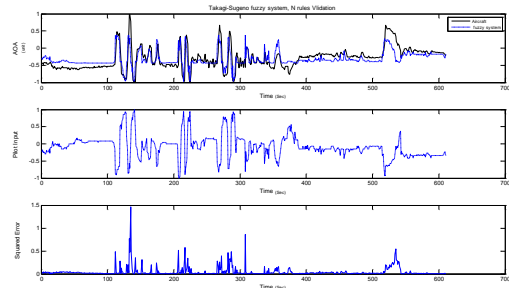


Fig.12. Comparing aircraft AOA experimental data by Takagi-Sugeno fuzzy system with a new input

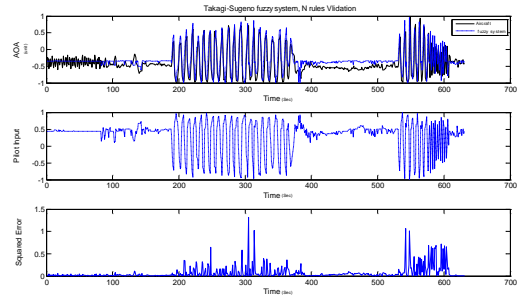


Fig.13. Comparing aircraft AOA experimental data by Takagi-Sugeno fuzzy system with a new input

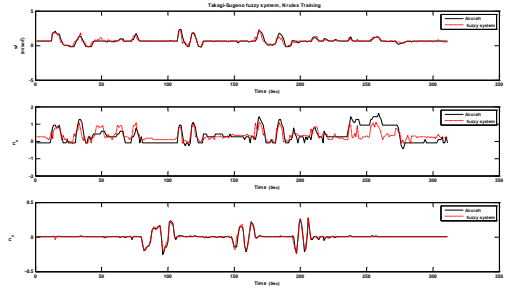


Fig.14. Results of aircraft linear accelerations training by experimental data in Takagi-Sugeno fuzzy system

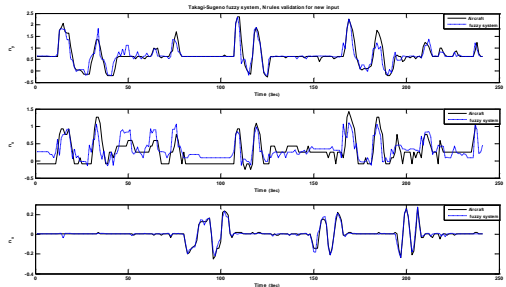


Fig.15. Results of aircraft linear accelerations validating data by experimental data in Takagi-Sugeno fuzzy system

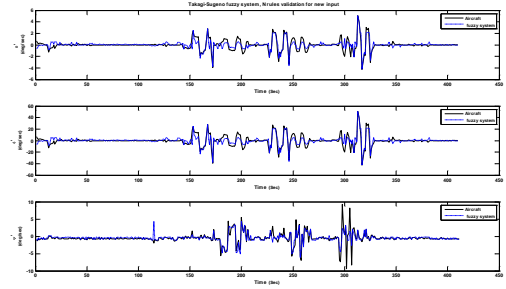


Fig.16. Results of aircraft angular accelerations validating by experimental data in Takagi-Sugeno fuzzy system

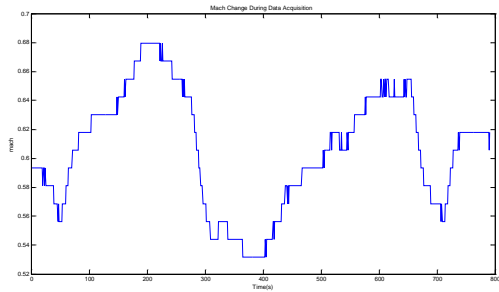


Fig.17. Mach changes for data test

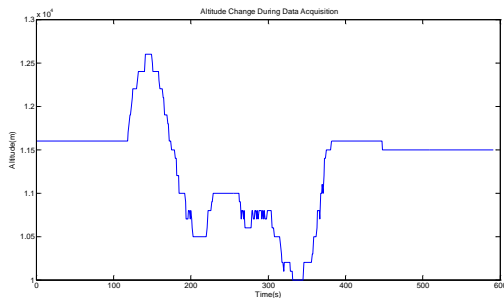


Fig.18. Altitude changes for training data

TABLE I. MSE OF TRAINING AND VALIDATING OF IDENTIFIED MODEL FOR EXPERIMENTAL FLIGHT DATA

States	Training MSE	Validating MSE
$\theta$	1.238	0.8134
$\psi$	0.0060	0.0038
$\phi$	0.0038	0.2474
$N_x$	0.1137	0.756
$N_y$	0.0629	0.424
$N_z$	0.0045	0.0024
$\alpha$	1.369	1.081

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