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Fuzzy Controller for Alarm at Air Flow Systems of Generators

This paper presents the fuzzy controller for alarm at air flow systems of generators. Using the fuzzy controller for alarm than when the air flow isn't in prescribed values will be avoiding the stator insulation destruction. The fuzzy controller was elaborated in MATLAB and operation was simulated in SIMULINK.

Keywords: *fuzzy, controller, generators, alarm, air flow*

1. Introduction

At generators, a protection supplementary modality was elaborated a fuzzy controller for alarm than when the air flow isn't in prescribed values will be avoiding the stator insulation destruction.

2. Presentation of fuzzy controller

The fuzzy controller has input specific functions of triangular type for error (e1) and error derivative (e2) and for output (Output1) have specific function of singleton functions.
In table 1 is presented the decision table (inference) for this case.

Table 1.

Output1		e1				
		BN	SN	Z	SP	BP
e2	BN	**BN**	**BN**	**BN**	**SN**	**Z**
	SN	**BN**	**BN**	**SN**	**Z**	**SP**
	Z	**BN**	**SN**	**Z**	**SP**	**BP**

	SP	**SN**	**Z**	**SP**	**BP**	**BP**
	BP	**Z**	**SP**	**BP**	**BP**	**BP**

This table corresponding at 5 linguistics terms involve the 25 linguistic rules; the terms from table 1 have the following significance:

- BN – big negative
- SN – small negative
- Z – zero
- SP – small positive
- BP – big positive

For this case used a Mamdani inference type and the resulted values from inference operation are used in defuzzification for obtained concrete command values. The defuzzification method used is a weight centre applied at singletons.

3. Results obtaining in MATLAB/SIMULINK program

On base of specific functions, an inference table and a defuzzification method was simulated through by MATLAB/SIMULINK program, the various cases which appear in practice, the obtained results shows in figure 1 until figure 4.

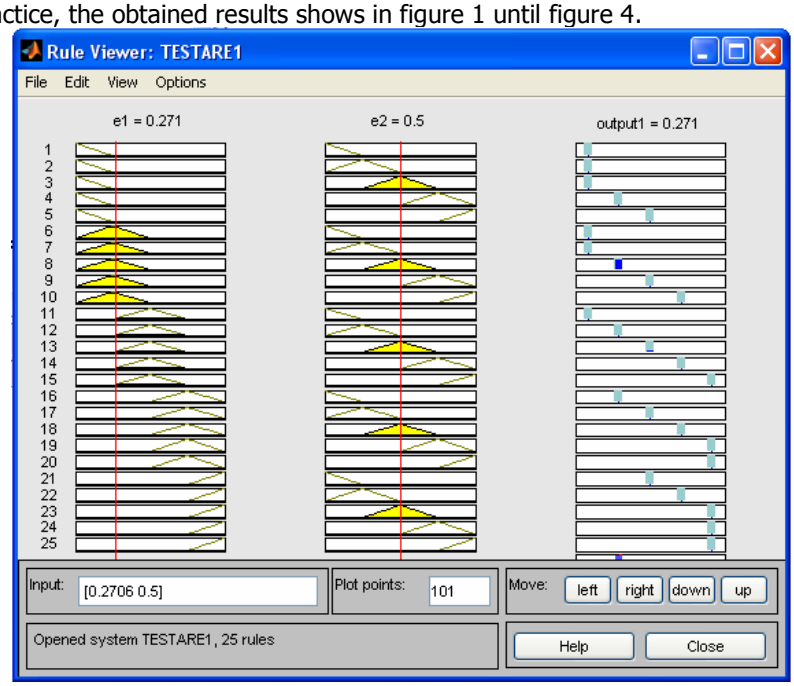

Figure 1. Inference at error e1=0.271 and error derivative e2=0.5

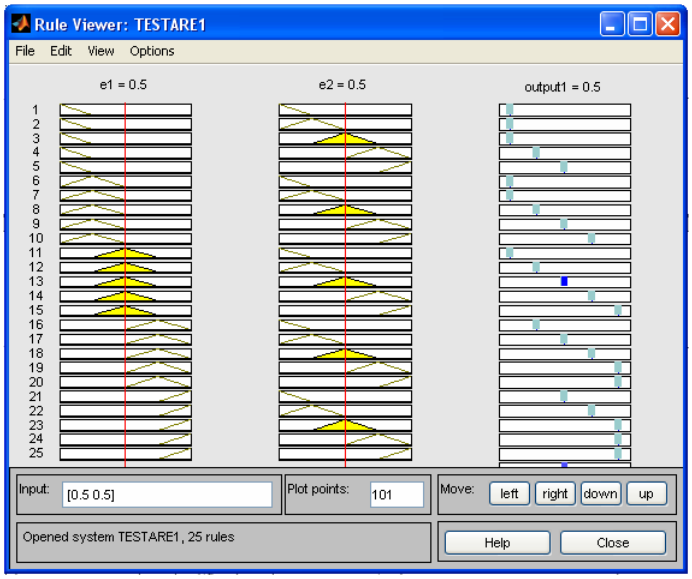

Figure 2. Inference at error e1=0.5 and error derivative e2=0.5

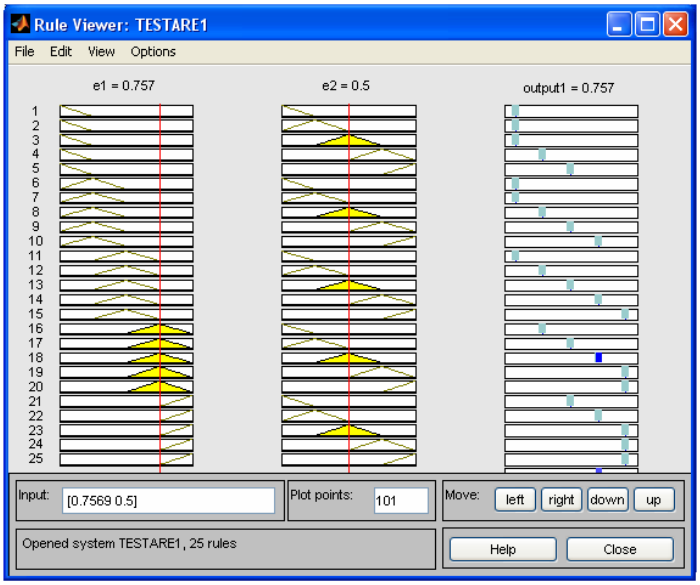

Figure 3. Inference at error e1=0.757 and error derivative e2=0.5

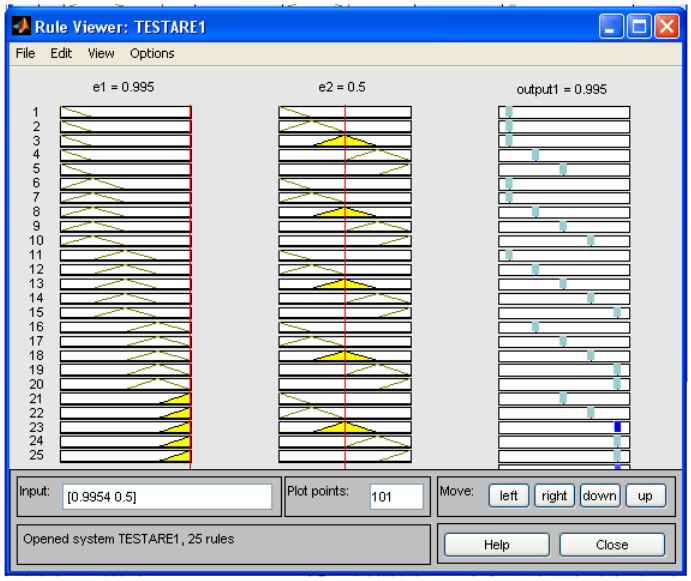

Figure 4. Inference at error e1=0.995 and error derivative e2=0.5

The SIMULINK model of fuzzy controller for alarm than when the air flow isn't in prescribed values is presented in figure 5 and system response is presented in figure 6.

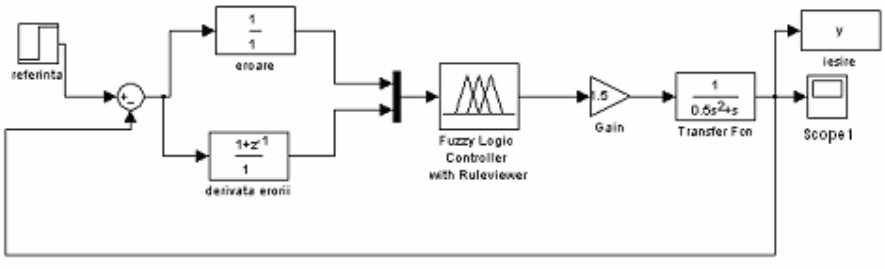

Figure 5. The SIMULINK model of systems for alarm

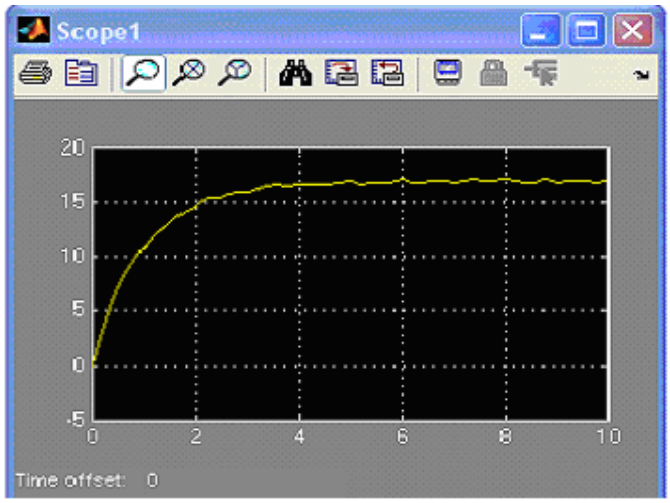

Figure 6. System response (wave form at output from system)

In figure 7 is presented the control surface of adjustment elements.

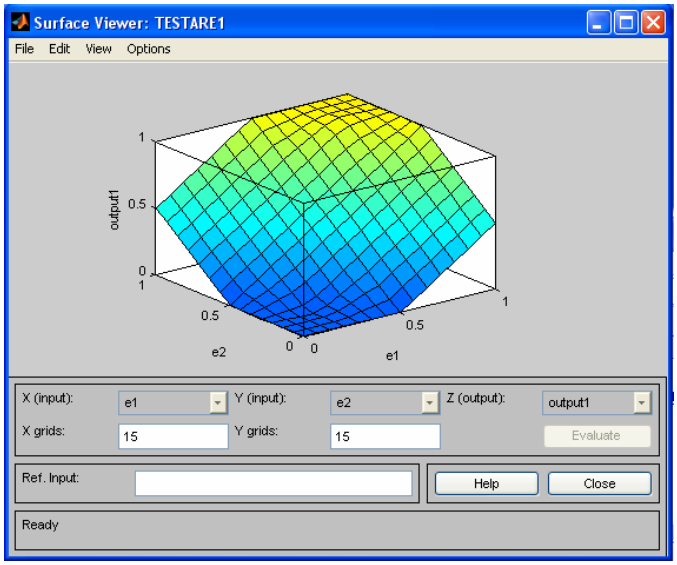

Figure 7. Control surface of adjustment elements

4. Conclusion

At generators, a protection supplementary modality was elaborated a fuzzy controller for alarm than when the air flow isn't in prescribed values will be avoiding the stator insulation destruction, take at generator stop.
Through fuzzy controller not follow and not drive the generator.
The obtained results from simulations show that fuzzy controller to assure a very good adjustment.

References

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