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Research Paper -Computer

A Study of Computer Application in Engineering Recent Advances

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A B S T R A C T

Computer Application in Electrical Engineering are realized in several modes such as control of power factor, voltage frequency, current and power. Recently the authors have a developed a Fuzzy Logic dead beat controller in the control of electric power system and the reliability control. The fuzzy logic dead beat controller is a computer like to simulate the FAM rules. One can directly obtain the complementary function of the objective as the Fuzzy Logic dead bead controller. The entire power system is simulated in the form of RLC parameters and their fuzzy grades of the truth are calculated. One can control the reliability control is possible by the controlling the failure rate and keeping the system working in the linear zone. All type of non-linear electrical network can be control using Fuzzy Logic controller and Neural Networks.

Key words: Fuzzy relativity, FMF, Cardinality, Complementary Function, Linear System etc.

Introduction:

Computer application in electrical Engineering and recent advances are simulated using Fuzzy Logic dead controller and Neural Controller can accept large number of input in parallel. One can design of fuzzy logic dead bet controller for P-F and Q-V loops of the alternator fuzzy logic dead beat controller is one step ahead to the classical fuzzy logic controller. A dead bead controller is one, in which the variation of the gain can bring all the poles and zeros to the origin. One can find the transfer function of a system and its inversion will give us the deadbeat controller. Dead beat Fuzzy logic controller is simulated for a system by finding the complementary function of the system. This function is called the dual unction or constraint of the system. If μ A(?) is the membership function of the system then, its Fuzzy Logic dead beat controller would be:

$$\mu A(\mu)C = 1 - \mu A(\mu)$$

Where, μ is the failure rate per hour or per year as the case be one can form the Fuzzy associative memory rules calling them FAM, rules for the FLC. It is difficult to run a system on linear conditions. All system runs on the non-linear zone and require Fuzzy Logic. The probability theory and superposition may not be valid for the electrical systems. All types of energy can be converted to the electrical circuits of RLC type to analyze the combined systems.

Simulation of Fuzzy logic deadbeat controller for a power system:

A large power system will require a Fuzzy Computer and neural network. If the system is nonliner and does not obey impedance diagram, then Fuzzy logic computer simulation will be required. One can refer the well known circuit of a synchronous generator for which FLC is simulated in Fig.1

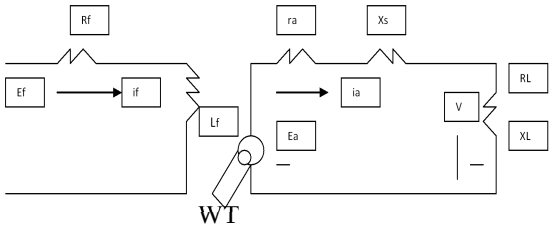

Figure 1: WT = EaIa

Under the non-linear conditions and heavy lauding of endurance's to the system, it will require a Fuzzy Logic Set Theory.

Xi	Fuzzy Element	μA(λ)	1	λR	Sec	T	A	μA(λ)C
1.	Ef	.776	.2536	.1968	.8032	3.943	.716	.224
2.	Rf*	.812	.20825	.1691	.8309	4.8022	.778	.188
3.	If*	.886	.121038	.10724	.89276	8.262	.836	.114
4	Lf	.773	.2574	.19903	.80103	3.885	.712	.227
5.	WT	.812	.20825	.1691	.8308	4.8022	.766	.188
6.	CO	.846	.16723	.14148	.8585	5.987	.811	.154
7.	T	.912	.0921152	.084009	.916	10.856	.882	.088
8.	Ea	.926	.07688	.07119	.9288	13.0072	.867	.074
9.	Ra	.836	.17192	.14974	.8502	5.583	.788	.164
10.	Xs	.772	.25877	.19977	.80023	3.864	.722	.228
11.	Ia	.836	.17912	.1497	.85025	5.582	.786	.164
12.	V	.884	.12329	.108995	.8910	8.1109	.811	.116
13.	Rl	.812	.20825	.169103	.83089	4.8019	.766	.188
14.	XL	.916	.08773	.08036	.9196	11.3986	.883	.448
15.	Cosθ	.856	.15548	.133095	.8669	6.4316	.802	.144
16.	F	.917	.08664	.0794	.92054	11.542	.876	.084
17.	Ns	.928	.07472	.0693	.93065	13.383	.886	.072
18.	Poles(P)	.836	.17912	.1497	.8502	5.582	.778	.164

The Fuzzy cardinality of Fuzzy set and synchronous generator would be

$$|A| = 15.336 = \sum_{i=1}^{18} \mu A(\lambda)d\lambda$$

The relative Fuzzy cardinality would be:

$$||A|| = 1/x = \int_1^n \mu A(\lambda)d\lambda = 0.852$$

The Fuzzy cardinality will provide that element 15 and 16 are cardinal elements. There are power factor of the load and the frequency of the generator. It may be laud frequency control. Our model seems to be optimistic because what we want is cardinal in the elements. The Fuzzy logic controller will control the power factor and frequency of the laud.

Fuzzy Logic Controller (FLC) Simulation:

Dead beat controller is that which can bring all the poles and zeroes to the origin or the unit circle in the centre when gain of the controller is changed. One can obtain the inverse of the transfer function of the synchronous generator to simulate the FLC one can form the FAM rules to instruct that FLC with IF AND THEN rules. The Fuzzy cardinality of complementary function ?, ?(?) C would be

$$|A| = 2.665 \text{ and } \|A\| = 0.14805$$

The elements 2 and 3 are cardinal, calling them field resistance, Rf and fiel current If. If the field current the power factor of a synchronous machine when working as a motor the same may be valid for the generator also. The Rf may control the power factor and frequency also.

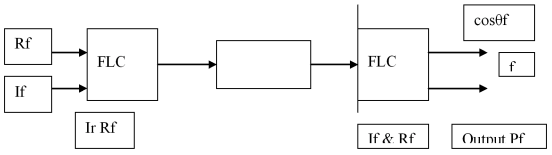

Fig. 2 FLC simulation using the complementary function of the generator

The FLC is a Fuzzy Logic Computer when fed by the FAM rules and IF, THEN rules one make a FAM rules for errors and changes of errors zero(ZE) positive medium (PM) , positive large (PL), Positive Small(PS) and ZE, NM, NL, NS for other direction.

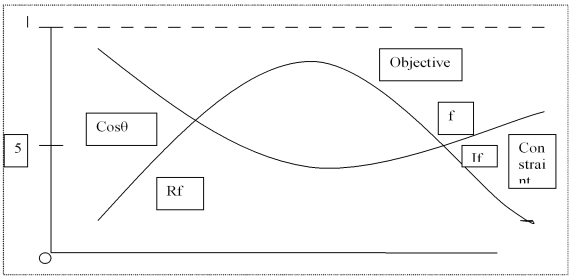

Figure. 3 plot of objective and constrain of the synchronous generator

A large plant like Bhilai, Rourkella, Durgapur, BHEL

A deadbeat Fuzzy logic controller in a form of recent computer is simulated for a large plant using Fuzzy logic objective and constraint theory. Thousands of elements are simulated using their element hoods with fuzzification using simple rules. The method is simple and similar to the method used in the Fig. 3 and Fig. 4. Recent Advances in Computer Applications to Electrical Engineering:

Xi	Fuzzy Element	μ	λ	λR	Sa	T	A	μc	M
1.	Analogues Controller	.886	.12103	.10723	.8927	.8.262	.866	.114	.887
2.	Sampled data Controllers	.798	.2256	.18006	.8199	4.432	.786	.202	.719
3.	Digital Controller	.957	.0439	.04206	.958	22.78	.943	.043	.916
4.	.Robust Controller	..892	.1128	.1094	.898	8.75	.932	.108	.812
5.	Adaptive Controller	.912	.0921	..084	.916	10.857	.906	.088	.796
6*.	Fuzzy Logic Controller	.926	.07688	.07119	.9288	13.0072	.858	.074	.876
7.	Neural Controller	.938	.064	.060036	.9399	15.625	.913	.062	.887

There several advancement in computer applications to electrical engineering system. One can convert all the controllers to FLC or Neural Controllers some of them are under the study of the authors.

The Fuzzy cardinality would be 6.309 indicating that events 6 and 7 are cardinal events called them Fuzzy Logic Controllers and Neural Controllers. The reliability will be 0.9012857 and MTBF, 9.6217 years. The complementary function μc of the seven controller would be 1.483 that is even 1 and 2 are dual. The analogue and sampled data controller are complementary events.

Analysis of non-linear electrical system is possible in the Recent advancement of computers:

One can study adaptive non-linear controllers of Reliability and fuzzy logic controllers to maintain the reliability of the output. There are no goal methods to study non-linear systems except the recent advances of neural networks and Fuzzy systems. One can form the computers and Fuzzy Computers in a simple manner. One can simulate a FAM rules for FLC.

Δθ↓	θ	NL	NM	NS	ZE	PS	PM	PL
Δθ↓	NL	NM	NS	ZE	PL	PS	PM	NL
	NM	NS	NM	PL	PM	NL	ZE	PS
	NS	ZE	NL	PM	PS	NM	PL	NS
	ZE	PL	PM	PS	ZE	NS	NM	NL
	PS	ZE	NL	NM	NS	PS	PM	PL
	PM	PM	NM	NL	NM	PL	ZE	PS
	PL	NM	NS	ZE	NL	PS	PM	PL

If θ is ZE and Δθ is ZE then velocity is ZE. Thus one can seven rules as given FAM rules.

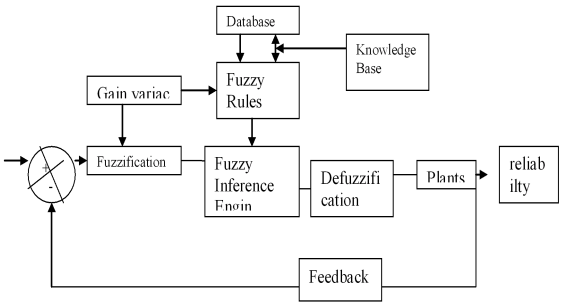

Figure. 4 FLC deadbeat type for a large plant like Bhilai Steel Plant

Discussion:

There is advancement in computers such as Nano-computers with nano-materials and Nano Technology useful for Electrical Engineering. Measurement of very small leakage current and voltage from the devices. The nanocurrent and nano voltage may be possible. One can measure very low frequency and high frequency by using Fuzzy Logic meters and Neural meters. All measuring instruments are in the form of digital computers, such as RLC tend digital meter and cash measure R,L,C parameters. The measurement of 10-6 A, to 10-12 A, A.C. current may be possible to measure by digital electronic meters. One can measure the voltage of 10-6 V to 10-12 Volt as well 106 V to 1012 Volt is possible by that meters. Computers have entered into microprocessor meters and relays. There is advancement in digital meters and MCB used in meter Boards to reduce space and heavy weight electromechanical meters and faces of heavy types.

Fuzzy Logic Controller and Fuzzy Logic dead beat controllers can be simulated for small fuse to a large controller of Bhilai Steel Plant and Blast furnace control in energy saving one can reduce the leakage of the systems using Fuzzy Devices.

REFERENCE

1. Mishra M. K. " Study of Reliability attributes of underground electrical power planning and distribution system of Mechanised coal faces " Ph. D. Thesis GGU Bilaspur, Sept. 2004. 2. Ekoote R. " Dead beat control of AVR and ALFC loops of synchronous generators" Teach sem. 5 Seminar February 23, 1995 Elect. Engg. PP 40-48. switch gear and protection Bombay Proceedings. 3. Porter B. and Bradshaw A. Design of dead beat controller and full order observer for linear multivariable discrete time plant" International Journal of Control, 1975, Vol. 22 No. 2, PP 149,155.4. Benjamin C. Kuo " Digital Control System" Holisanders International Editors (Books) 1980, Printed in Japan, 1981.5. Parihar R.S. " Development of Elecrical Power Systems reliability based system parameters and Fuzzy Control " Ph. D. Thesis, GGU , Bilaspur, April 2005. 6. Qureshi M.F. " Relibility attributes of Nuclear Power System using Fuzzy Logic" Ph. D. Thesis, GGU, Bilaspur. 7. Agrawal S.K. " Mathemetical Study of Relibility of Materials" Ph. D. Thesis GGU, Bilaspur, 1996.