SOLUTION TO AN ECONOMIC LOAD DISPATCH PROBLEM USING FUZZY LOGIC

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ABSTRACT: The problem based on economic operation of an electrical power generation using classical method. The problem aims at minimizing fuel cost, lamda and power loss. In this two power generation are taken onto an account and on the basis of fuel cost, power generation cost, power loss are calculated by Fuzzy toolbox using FIS editor. The fuzzy members are helpful in modeling uncertain input data because they allow to consider with the expert knowledge on input parameters. This approachis specifically applied to generation cost assessment of main fuel cost technologies of generation in some countries. In addition, these fuel costs are compared with manually calculated fuel costs. Objectives are expressed by means of fuzzy set membership functions, higher the member ship functions greater is the satisfaction with the solution. The fuzzy sets more accurately represents the operation of the power system.

I INTRODUCTION

The basic objective of Economic Load Dispatch of electric power generation is to schedule the committed generating unit outputs, so as to meet the load demand at minimum operating cost while satisfying all units and system equality and inequality constaints. The ELD problem has been tackles by many researches in the past.ELD problem involves different problems. The first Unit commitment or pre-dispatch problem where in it is required to select optimally out of available generating sources to operate to meet the expected load and provide a specified margin of operating reserve over a specified period of time. The second aspect of ELD is on-line economic dispatch where in it is required to distribute the load among generating units actually parallel with the system in such a manner as to minimize the toatal cost of supplying power. In case of ELD, the generations are not fixed but they are allowed to take values again within certain limits to meet a load demand with minimum costs. The efficient and optimum economic operation of electric power system has always occupied an important position in electric power industry. In recent decades, it is becoming very important for utilities to run their power system with minimum cost while satisfying their customer demand all the time and trying to make profit. With limited availability of generating units and the large increase in power demand, fuel cost and supply limitation, the committed units should serve the expected load demand with changes in fuel cost and the uncertainties in the load demand forecast in all the different time intervals in an optimal manner.

II FUZZY LOGIC INTRODUCTION

A. What Is Fuzzy Logic?

FL is a problem-solving control system methodology that tends itself to implementation in systems ranging from simple, small, embedded micro-controllers to large, networked, multi-channel PC or workstation-based data acquisition and control systems. It can be implemented in hardware, software, or a combination of both. FL provides a simple way to arrive at a definite conclusion based upon vague, ambiguous, imprecise, noisy, or missing input information. FL's approach to control problems mimics how a person would make decisions, only much faster. Fuzzy logic seems closer to the way our brains work. We aggregate data and form a number of partial truths which we aggregate further into higher truths which in turn, when certain thresholds are exceeded, cause certain further results such as motor reaction. A similar kind of process is used in artificial computer neural network and expert systems.

B. How Is Fl Used?

1) Define the control objectives and criteria: What am I trying to control? What do I have to do to control the system? What kind of response do I need? What are the possible (probable) system failure modes?

2) Determine the input and output relationships and choose a minimum number of variables for input to the FL engine (typically error and rate-of-change-of-error).

3) Using the rule-based structure of FL, break the control problem down into a series of rules that define the desired system output response for given system input conditions. The number and complexity of rules depends on the number of input parameters that are to be processed and the number fuzzy variables associated with each parameter. If possible, use at least one variable and its time derivative. Although it is possible to use a single, instantaneous error parameter without knowing its rate of change, this cripples the system's ability to minimize overshoot for a step inputs.

4) Create FL membership functions that define the meaning (values) of Input/Output terms used in the rules.

5) Test the system, evaluate the results, tune the rules and membership functions, and retest until satisfactory results are obtained.

C. Applications Of Fuzzy Logic

1) One of the most famous applications of fuzzy logic is that in Sendai, Japan. This used a fuzzy controller to run the train all day long. This made the line one of the smoothest running subway systems in the world and increased efficiency as well as stopping time.
2) Fuzzy control is in industrial automation. Fuzzy logic based PLCs have been developed by companies.

- Anti-Sway Control of Cranes
- Temperature Control in Plastic Molding Machines
- Climate Control and Building Automation
- Wind Energy Converter Control.

3) Fuzzy logic can be used in any decision making process such as signal processing or data analysis.
D. Fuzzy Control: Fuzzy control, which directly uses fuzzy rules, is the most important application in fuzzy theory. Using a procedure originated by Ebrahim Mamdani in the late 70s, three steps are taken to create a fuzzy controlled machine.
1) Fuzzification (Using membership function to graphically describe a situation)
2) Rule evalution (Application of Fuzzy rules)
3) Defuzzification (Obtaining the crisp or actual results).
***Advantages-*:**1)Allow the use of vague linguistic terms in the rules.
2) Fuzzy logic solutions are easy to verify and optimize.
Disadvantages-:1)It is difficult to optimize membership functions.
2) There are many ways of interpreting fuzzy rules combining the output of several fuzzy rules and Defuzzifying the outputs.

III FUZZY SET THEORY IN POWER SYSTEMS

***A. Introduction*:** FL requires some numerical parameters in order to operate such as what is considered significant error and significant rate-of-change-of-error, but exact values of these numbers are usually not critical unless very responsive performance is required in which case empirical tuning would determine them. For example, a simple temperature control system could use a single temperature feedback sensor whose data is subtracted from the command signal to compute "error" and then time-differentiated to yield the error slope or rate-of-change-of-error, hereafter called "error-dot". Error might have units of degs F and a small error considered to be 2F while a large error is 5F. The "error-dot" might then have units of degs/min with a small error-dot being 5F/min and a large one being 15F/min. These values don't have to be symmetrical and can be "tweaked" once the system is operating in order to optimize performance. Generally, FL is so forgiving that the system will probably work the first time without any tweaking.
In engineering and economics, many problems involve multiple objectives which are not describable as the-more-the-better or the-less-the-better; instead, there is an ideal target value for each objective, and the desire is to get as close as possible to the desired value of each objective. For example, one might want to adjust a rocket's fuel usage and orientation so that it arrives both at a specified place and at a specified time; or one might want to conduct open market operations so that both the inflation rate and the unemployment rate are as close as possible to their desired values. Often such problems are subject to linear equality constraints that prevent all objectives from being simultaneously perfectly met, especially when the number of controllable variables is less than the number of objectives and when the presence of random shocks generates uncertainty. Commonly a multi-objective quadratic objective function is used, with the cost associated with an objective rising quadratically with the distance of the objective from its ideal value. Since these problems typically involve adjusting the controlled variables at various points in time and/or evaluating the objectives at various points in time, intertemporal optimization techniques are employed.

B. Fuzzy Logic Economic Load Dispatch Based: ELD problem is one of the fundamental issues in power system. It is an optimization problem and its objective is to reduce the total power generation cost of units. ED is a process of allocating generation levels to the generating units so that the system load is fully supplied in the most economic way, and its defined as the operation of generation facilities to produce energy at lowest cost to reliably serve consumers any operational limits of generation and transmission. The ELD problem assumes that amount of power to be supplied by a given set of units is constant for a given interval of time and attempts to minimize cost of supplying energy of the generating units. The ED can be defined as the process of allocating generation level to generation units, so system load is supplied and most economically.
***C. Membership Functions*:** The membership function is a graphical representation of the magnitude of participation of each input. It associates a weighting with each of the inputs that are processed, define functional overlap between inputs, and ultimately determines an output response. The rules use the input membership values as weighting factors to determine their influence on the fuzzy output sets of the final output conclusion. There are different membership functions associated with each input and output response. Some features to note are:
SHAPE - triangular is common, but bell, trapezoidal, exponential have been used. More complex functions are possible but require greater computing overhead to implement.
HEIGHT or magnitude (usually normalized to 1) WIDTH (of the base of function), SHOULDERING (locks height at maximum if an outer function. Shouldered functions evaluate as 1.0 past their center) CENTER points (center of the member function shape)

***D. Algorithm*:** Read data namely cost coefficients,a_i,$_{bi}$,c_i;B-coefficients,B_{ij},B_{i0},B_{00}(i=1,2…NG); j=1,2,………,NG);step size α and maximum iterations allowes, ITMAX, etc.

1. Compute the initial values og pg_1(i=1,2…NG) and λ by assuming that the transmission losses are zero i.e. P_L=0.Then the problem can be stated and the solution can be obtained directly using equations -:

$$\lambda = P_D+b_1/2*a_1+b_2/2*a_2/1/2*a_1+1/2a \ \&$$
$$pg_1 = \lambda - b_1/2a_1 ; \quad pg_2 = \lambda - b_2/2a_2$$

2. Set iteration counter, IT = 1.
3. Compute P_{gi}(i=1,2…NG) using eq.

5. Compute transmission loss using eq.

$P_L = 0.001(pg_1)^2+0.002(pg_2)^2-2*0.0002(pg_1)(pg_2)$.

6. Compute $\Delta P = PD + P_L - \Sigma p_{gi}$.

7.Check | ΔP |$\leq \epsilon$, if 'yes', then GOTO step 10.

8.Update $\lambda^{new} = \lambda + \alpha \Delta P$.

9. IT = IT+1, $\lambda^{new} = \lambda$ and GOTO step 4 and repeat.

10. Compute optimal total cost from eq. and transmission loss.

$$f1(pg_1)=0.0889(pg_1)^2+10.333(pg_1)+200$$

$$f2(pg_2)=0.00741(pg_2)^2+10.833(pg_2)+240$$

11. STOP.

IV *ECONOMIC LOAD DISPATCH PROBLEM USING FUZZY LOGIC*

TABLE 1

RESULT AND ERROR FOR MANNUALLY CALCULATED TABLE AND FUZZY LOGIC TABLE

	ASSUMED VALUES		*CALCULATED VALUES*							*FUZZY TABLE*							*ERROR TABLE*	
IT	**PD**	**PG1**	**PG2**	**PG1**	**PG2**	**L**	**PL**	**f1**	**f2**	**F**	**PG1**	**PG2**	**L**	**PL**	**f1**	**f2**	**F**	**Error F**	**E P.L**
1	80	51.71	28.29	25.98	10.9	11.3	0.79	474.45	358.96	833.412	41.2	20.8	12.1	5.52	474.45	468.5	942.98	-109.57	-4.73
2	80	10.9	25.98	44.01	22.5	12.1	2.55	671.97	487.159	1159.13	56.6	40.5	12.1	5.52	813.33	690.9	1504.2	-345.09	-2.97
3	80	22.47	44.01	52.06	28.4	12.5	3.75	762.03	554.084	1316.11	56.5	40.5	12.1	5.52	812.19	690.9	1503.1	-186.97	-1.77
4	80	28.44	52.26	54.24	29.9	12.5	4.08	786.62	570.757	1357.37	56.5	40.5	12.1	5.52	812.19	690.9	1503.1	-145.71	-1.44
5	80	29.92	54.24	54.38	48.9	12.5	6.68	788.2	787.915	1576.11	56.5	40.5	12.1	5.52	812.19	690.9	1503.1	73.028	1.16
18	120	69.89	50.11	36.03	17.4	11.6	1.65	583.84	431.181	1015.02	58.6	25.3	12.5	5.52	836.04	518.8	1354.9	-339.84	-3.87
19	120	17.44	36.03	61.76	56.3	12.9	8.77	872.08	873.735	1745.81	56.5	40.5	12.1	5.52	812.19	690.9	1503.1	242.73	3.25
20	120	56.33	61.76	70.68	39.2	13.2	6.96	974.75	676.154	1650.9	56.5	40.5	12.1	5.52	812.19	690.9	1503.1	147.82	1.44
21	120	39.21	70.68	75.33	44.2	13.5	8.25	1028.8	733.525	1762.36	102	20.8	12.1	5.51	1346.5	468.5	1815	-52.633	2.74
22	120	44.22	75.33	79.27	46.7	13.7	9.16	1075	762.177	1837.14	56.5	40.5	12.5	5.51	812.19	690.9	1503.1	334.05	3.65
2	12	46.71	79.	80.	47.	13.	9.5	1092	774.6	1867.	79	35.	13.	5.5	1071	637.	1709	158.	4.04

3	0		27	78	8	7	5	.7	33	34		8	4	1	.8	3	.1	24	
24	120	47.79	80.78	81.28	48.1	13.8	9.67	1098.6	778.673	1877.27	79.3	45.4	14.2	7.86	1075.3	747.1	1822.4	54.868	1.81
25	120	48.14	81.28	81.41	48.2	13.8	9.71	1100.1	779.828	1879.96	79.3	45.4	14.2	7.86	1075.3	747.1	1822.4	57.554	1.85
26	120	48.24	81.41	81.44	48.3	13.8	9.72	1100.5	780.059	1880.54	79.3	45.4	14.2	7.86	1075.3	747.1	1822.4	58.138	1.86
29	160	88.07	71.93	45.9	23.8	11.9	2.8	693.01	501.911	1194.93	80.8	79.3	14.2	7.86	1092.9	1146	2238.6	-1043.7	-5.06
30	160	23.79	45.9	78.56	45.5	12.8	8.88	1066.6	748.472	1815.1	79.3	45.4	14.2	7.86	1075.3	747.1	1822.4	-7.3041	1.02
31	160	45.52	78.56	97.48	58.3	14.7	14	1291.7	897.101	2188.84	79.3	45.5	14.2	7.86	1075.3	748.2	1823.6	365.28	6.17
32	160	58.33	97.48	105.4	63.7	15	16.5	1387.4	960.483	2347.85	79.3	45.5	14.2	7.86	1075.3	748.2	1823.6	524.3	8.67
33	160	63.73	105.4	108.6	65.9	15.2	17.6	1426.4	986.193	2412.59	79.3	45.5	14.2	7.86	1075.3	748.2	1823.6	589.04	9.75
34	160	65.91	108.6	109.9	66.8	15.2	18.1	1442.7	996.828	2439.55	71.8	40.5	13.8	5.51	987.74	690.9	1678.6	760.92	12.55
35	160	66.81	109.9	110.5	67.2	15.3	18.3	1449.7	1001.44	2451.17	71.8	50.4	12.9	5.51	987.74	804.8	1792.5	658.63	12.75
37	160	67.2	110.5	110.7	67.4	15.3	18.4	1452.8	1003.45	2456.26	87	50.4	14.6	10.2	1166.3	804.8	1971.1	485.19	8.15
38	160	67.37	110.7	110.8	67.4	15.3	18.4	1454.2	1004.28	2458.44	102	60.3	15.5	15	1346.5	920.2	2266.6	191.81	3.38
39	160	67.44	110.8	110.9	67.5	15.3	18.4	1454.8	1004.75	2459.53	102	60.3	15.5	15	1346.5	920.2	2266.6	192.9	3.4
40	160	67.48	110.9	110.9	67.5	15.3	18.4	1455.1	1004.87	2460.01	102	60.3	15.5	15	1346.5	920.2	2266.6	193.38	3.41
41	160	67.49	110.9	110.9	67.5	15.3	18.4	1455.3	1004.99	2460.26	102	60.3	15.5	15	1346.5	920.2	2266.6	193.62	3.41
42	160	67.5	110.9	110.9	67.5	15.3	18.4	1455.3	1004.99	2460.26	102	60.3	15.5	15	1346.5	920.2	2266.6	193.62	3.41
43	160	67.5	110.9	110.9	67.5	15.3	18.4	1455.3	1004.99	2460.26	102	60.3	15.5	15	1346.5	920.2	2266.6	193.62	3.41
44	200	106.3	70.09	52.86	38.1	12.2	4.89	771.04	663.608	1434.65	102	60.3	15.5	15	1346.5	920.2	2266.6	-831.98	-10.11
45	200	38.11	52.86	146.6	86.3	17.9	31.3	1905.4	1229.95	3135.31	102	60.3	15.5	15	1346.5	920.2	2266.6	868.68	16.31
46	200	86.29	146.6	152	93.4	17.8	34.9	1975.4	1316.93	3292.29	102	60.3	15.5	15	1346.5	920.2	2266.6	1025.7	19.87
47	200	93.44	152	145.6	89.6	17.3	32	1892.3	1270.13	3162.43	102	60.3	15.5	15	1346.5	920.2	2266.6	895.8	17.02
48	200	89.6	145.6	142.8	87.8	17.2	30.8	1856.8	1247.65	3104.49	102	60.3	15.5	15	1346.5	920.2	2266.6	837.86	15.78
49	200	87.75	142.8	142.7	87.6	17.2	30.7	1855.7	1246.08	3101.75	41.2	40.5	12.1	5.51	640.81	690.9	1331.7	1770.1	25.21
50	200	87.62	142.7	143	87.8	17.2	30.8	1859	1247.9	3106.92	133	80	17.2	33.9	1731.5	1154	2885.6	221.31	-3.07
51	200	87.77	143	143.1	87.8	17.2	30.9	1860.1	1248.62	3108.68	148	89.9	17.7	33.9	1924	1274	3197.8	-89.107	-3.04
52	200	87.83	143.1	143	87.8	17.2	30.9	1859.9	1248.62	3108.55	144	92.7	17.7	37.2	1872.3	1308	3180.2	-71.641	-6.34
53	200	87.83	143	143	87.8	17.2	30.9	1859.7	1248.5	3108.17	148	89.9	17.7	33.9	1924	1274	3197.8	-89.614	-3.04
54	200	87.82	143	143	87.8	17.2	30.9	1859.7	1248.5	3108.17	148	89.9	17.7	33.9	1924	1274	3197.8	-89.614	-3.05

55	200	87.82	143	143	87.8	17.2	30.9	1859.7	1248.5	3108.17	148	89.9	17.7	33.9	1924	1274	3197.8	-89.614	-3.05
56	240	124.4	115.6	65.14	36	12.5	5.89	910.81	639.023	1549.84	148	89.9	17.7	33.9	1924	1274	3197.8	-1647.9	-28.01
57	240	35.95	65.14	109.5	65.4	15.4	17.7	1438.5	980.408	2418.96	148	89.9	17.7	33.9	1924	1274	3197.8	-778.83	-16.21
58	240	65.42	109.5	138.7	84.3	17.1	28.8	1804.6	1205.52	3010.11	148	89.9	17.7	33.9	1924	1274	3197.8	-187.67	-5.13
59	240	84.27	138.7	154	94.1	18	35.6	2002	1325.49	3327.48	148	89.9	17.7	33.9	1924	1274	3197.8	129.69	1.74
60	240	94.14	154	162.6	99.6	18.6	39.8	2115.2	1392.48	3507.66	148	89.9	17.7	33.9	1924	1274	3197.8	309.88	5.9
61	240	99.6	162.6	167.9	103	18.9	42.4	2184.9	1433.18	3618.03	102	60.6	15.5	24.4	1346.5	923.7	2270.1	1347.9	18.04
62	240	102.9	167.9	171.2	105	19.1	44.2	2230	1459.28	3689.26	102	60.3	15.5	15	1346.5	920.2	2266.6	1422.6	29.18
63	240	105	171.2	173.5	106	19.3	45.4	2260.3	1476.64	3736.89	133	80	17.2	24.4	1731.5	1154	2885.6	851.29	20.96
64	240	106.4	173.5	175	107	19.4	46.2	2280.8	1488.44	3769.24	148	89.9	18	33.9	1924	1274	3197.8	571.45	12.27
66	240	108..01	176.1	176.8	108	19.5	47.1	2304.8	1502.12	3806.88	148	89.9	18	38.6	1924	1274	3197.8	609.09	8.51
67	240	108.5	176.8	176.3	109	19.6	47.4	2298.2	1505.35	3803.51	148	89.9	18	38.6	1924	1274	3197.8	605.72	8.76
68	240	108.7	176.3	177.7	109	19.6	47.6	2316.5	1508.84	3825.33	148	89.9	18	38.6	1924	1274	3197.8	627.54	8.98
69	240	109	177.7	177.9	109	19.6	47.7	2319.9	1510.7	3830.57	148	89.9	18	38.6	1924	1274	3197.8	632.78	9.11
70	240	109.2	177.9	177.7	109	19.6	47.8	2316.5	1512.07	3828.56	148	89.9	18	38.6	1924	1274	3197.8	630.78	9.21
71	240	109.3	177.7	177.9	109	19.6	47.9	2319.9	1512.94	3832.81	148	89.9	18	38.6	1924	1274	3197.8	635.02	9.27
72	240	109.3	177.9	178.1	109	19.7	47.9	2322.3	1513.69	3835.99	148	89.9	18	38.6	1924	1274	3197.8	638.2	9.32
73	240	109.4	178.1	178.2	109	19.7	48	2323.9	1514.06	3837.98	148	89.9	18	38.6	1924	1274	3197.8	640.19	9.35
74	240	109.4	178.2	178.3	109	19.7	48	2325.1	1514.44	3839.57	148	89.9	18	38.6	1924	1274	3197.8	641.78	9.38
75	240	109.5	178.3	178.4	109	19.7	48	2325.9	1514.69	3840.63	148	89.9	18	38.6	1924	1274	3197.8	642.84	9.39
76	240	109.5	178.4	178.4	109	19.7	48	2326.5	1514.81	3841.29	148	89.9	18	38.6	1924	1274	3197.8	643.51	9.4

TABLE:2

MANUALLY CALCULATED TABLE		FUZZY TABLE		ERROR TABLE	
POWER LOSS	**F**	**POWER LOSS**	**F**	**Error F**	**PL**
0.79	833.41182	5.52	942.9843	-109.5725	-4.73
2.55	1159.133	5.52	1504.2182	-345.0852	-2.97
3.75	1316.114	5.52	1503.0844	-186.9703	-1.77
4.08	1357.3729	5.52	1503.0844	-145.7114	-1.44
6.68	1576.1128	5.52	1503.0844	73.02844	1.16

1.65	1015.0199	5.52	1354.8597	-339.8397	-3.87
8.77	1745.8105	5.52	1503.0844	242.72616	3.25
6.96	1650.9021	5.52	1503.0844	147.81777	1.44
8.25	1762.357	5.51	1814.9898	-52.63282	2.74
9.16	1837.136	5.51	1503.0844	334.05169	3.65
9.55	1867.3433	5.51	1709.1078	158.23543	4.04
9.67	1877.2705	7.86	1822.403	54.867501	1.81
9.71	1879.9565	7.86	1822.403	57.55353	1.85
9.72	1880.5409	7.86	1822.403	58.137913	1.86
2.8	1194.9251	7.86	2238.6006	-1043.676	-5.06
8.88	1815.0989	7.86	1822.403	-7.304112	1.02
14.03	2188.8373	7.86	1823.5536	365.2837	6.17
16.53	2347.8533	7.86	1823.5536	524.29964	8.67
17.61	2412.592	7.86	1823.5536	589.03832	9.75
18.06	2439.5523	5.51	1678.6302	760.92206	12.55
18.26	2451.1707	5.51	1792.5453	658.62547	12.75
18.35	2456.2566	10.2	1971.0652	485.19142	8.15
18.38	2458.4381	15	2266.6309	191.80721	3.38
18.4	2459.5266	15	2266.6309	192.8957	3.4
18.41	2460.0141	15	2266.6309	193.38317	3.41
18.41	2460.2554	15	2266.6309	193.62455	3.41
18.41	2460.2554	15	2266.6309	193.62455	3.41
18.41	2460.2554	15	2266.6309	193.62455	3.41
4.89	1434.6503	15	2266.6309	-831.9805	-10.11
31.31	3135.3144	15	2266.6309	868.68348	16.31
34.87	3292.2913	15	2266.6309	1025.6604	19.87
32.02	3162.4265	15	2266.6309	895.79562	17.02
30.78	3104.4891	15	2266.6309	837.85818	15.78
30.72	3101.7534	5.51	1331.7006	1770.0528	25.21
30.83	3106.9202	33.9	2885.6082	221.31203	-3.07
30.86	3108.6783	33.9	3197.785	-89.10661	-3.04
30.86	3108.5496	37.2	3180.1904	-71.64084	-6.34
30.86	3108.1707	33.9	3197.785	-89.61424	-3.04
30.85	3108.1707	33.9	3197.785	-89.61424	-3.05
30.85	3108.1707	33.9	3197.785	-89.61424	-3.05
5.89	1549.8369	33.9	3197.785	-1647.948	-28.01
17.69	2418.956	33.9	3197.785	-778.8289	-16.21
28.77	3010.1127	33.9	3197.785	-187.6723	-5.13
35.64	3327.4751	33.9	3197.785	129.69013	1.74
39.8	3507.6616	33.9	3197.785	309.87661	5.9
42.44	3618.0334	24.4	2270.1496	1347.8838	18.04

44.18	3689.256	15	2266.6309	1422.6251	29.18
45.36	3736.8939	24.4	2885.6082	851.28573	20.96
46.17	3769.2399	33.9	3197.785	571.45499	12.27
47.11	3806.8754	38.6	3197.785	609.09045	8.51
47.36	3803.509	38.6	3197.785	605.72409	8.76
47.58	3825.3267	38.6	3197.785	627.5417	8.98
47.71	3830.5676	38.6	3197.785	632.78267	9.11
47.81	3828.5637	38.6	3197.785	630.77878	9.21
47.87	3832.809	38.6	3197.785	635.02402	9.27
47.92	3835.9858	38.6	3197.785	638.20088	9.32
47.95	3837.9796	38.6	3197.785	640.1946	9.35
47.98	3839.5684	38.6	3197.785	641.78347	9.38
47.99	3840.6278	38.6	3197.785	642.84281	9.39
48	3841.2925	38.6	3197.785	643.50755	9.4

V Conclusion

In this project Fuzzy logic controlled algorithm has been successfully introduced to obtain optimum solution of ELD. Power system has large variation in load from time to time & it is possible to have the load dispatch for every possible load demand. As there is no general procedure for finding out optimum solution of economical load dispatch. This is where Fuzzy controlled pay an important role to find out optimum solution in fraction of seconds. It is found that Fuzzy is giving better result than manually calculated that proves that fast algorithm & true optimum generation of fuel cost and transmission losses.

VI Future Scope

The study of fuzzy logic for Economic Load Dispatch, the scope of the work has been identified as-:

1. Extend the fuzzy logic controlled system having large number of units i.e. 10 or even higher units.
2. Extend the problem of ELD by using Genetic algorithm.
3. Extend the fuzzy logic controlled system based on ELD by including various facts devices.

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