Automatic Generation Control of Interconnected Power System by using Optimization Technique

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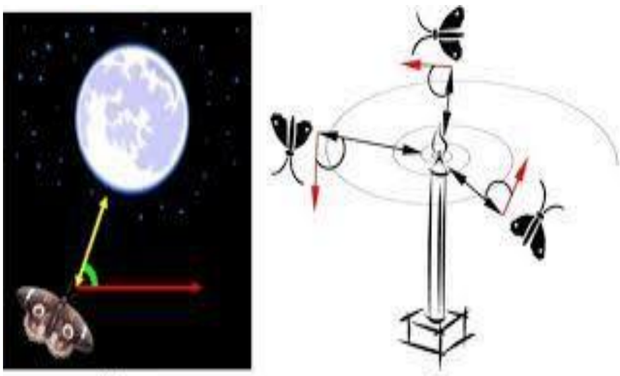
Abstract: **Any disturbances in the load demand leads to change in system frequency variations. In order to overcome such circumstances Automatic. Generation Control (AGC) is adopted. Various controllers like Proportional Integral Derivative (PID), Proportional Integral (PI), integral(I), and intelligent Controllers like Fuzzy Logic Controllers are employed as secondary control to solve AGC problems. However, the controllers alone are not enough to solve the problems, and therefore requiring further improvement by optimization of the gains and parameters of the controller, for better and efficient operation of the powersystem.**

Keywords - Automatic Generation Control (AGC), PID Controller, Non linearity, Moth flame optimization technique
path shows a conceptual model of transverse orientation[1].

I. INTRODUCTION

Automatic generation control is an interconnected power system plays major role to maintain system frequency stable in real life scenario. Load may not be constant, load will changes either increase or decrease based on the consumer needs, in this scenario we should maintain system frequency constant and quality output to the consumers need. For all these effects of the system ,AGC will regulate the power system network and PID controller is to reduce the frequency deviations occurs in the system network.in PID controller the gains and parameters like Proportional gain(Kp),Integral gain(Ki) and Derivative gain(Kd) are occurs, so we have to optimize or tune those gains and parameters for desired optimal values for better and quality output for the use of consumer needs[3]. For the optimizing or tuning the gains and parameters of the controller we are introducing the optimization technique called moth flame optimization algorithm.it is a novel nature-inspired optimization pattern[2].

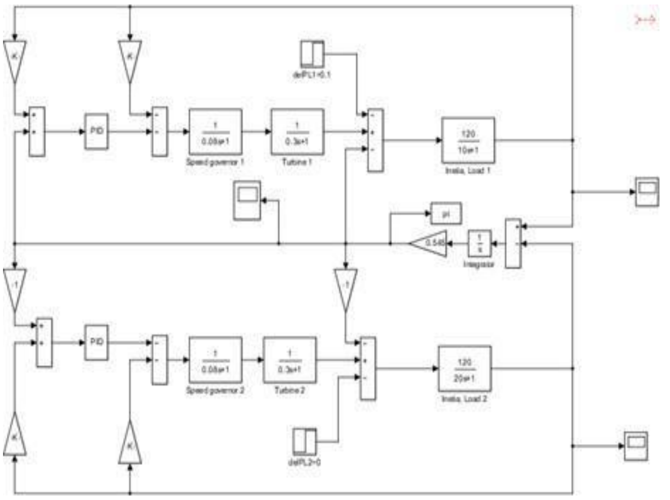
The main inspiration of this optimizer is the navigation method of moths in nature called transverse orientation[1]. Moths are fancy insects, which are highly similar to the family of butterflies. Basically, there are over 160,000 various species of this insect in nature. They have two main milestones in their lifetime: larvae and adult. The larvae are converted to moth by cocoons. The most interesting fact about moths aretheir special navigation methods in night? They have been evolved to fly in night using the moon light. They utilized a mechanism called transverse orientation for navigation. In this method, a moth flies by maintaining a fixed angle with respect to the moon, a very effective mechanism for travelling long distances



(a) (b)

Despite the effectiveness of transverse orientation, we usually observe that moths fly spirally around the lights. In fact, moths are tricked by artificial lights and show such behavior[4]. This is due to the inefficiency of the transverse orientation, in which it is only helpful for moving in straight line when the light source is very far. When moths see a human-made artificial light, they try to maintain a similar angle with the light to fly in straight line. Since such a light is extremely close compared to the moon, however, maintaining a similar angle to the light source causes a useless or deadly spiral fly path for moths We mathematically model this behavior and propose an optimizer called Moth-Flame Optimization (MFO) algorithm.

II. BLOCKDIAGRAM



III. RESULTS ANDDISCUSSION

For various load disturbances (0.1,0.5) to the proposed model with PI, PID controllers obtain the desired results[3]. Comparison between time, frequency, tie line power under the various loading conditions along with controllers have been depicted in plots.

Table 1:For PI controller

Iteration	load	AREA 1		AREA 2		Best optimal value
		Kp1	Ki 1	Kp2	Ki 2	
2	0.1	1.56	1.45	-0.7	1.0	85.4175
2	0.5	0.71	1.85	-0.3	2.59	110669.29

Table 2:For PID controller

Iteration	load	AREA 1			AREA 2			Best optimal value
		kp 1	Ki 1	Kd1	Kp2	Ki 2	Kd2	
2	0.1	-2.0265	3.669	2.2292	1.5369	0.056	1.838	5712.7
2	0.5	-0.1110	3.311	0.4088	2.9258	4.737	1.031	5.489

Plots:-

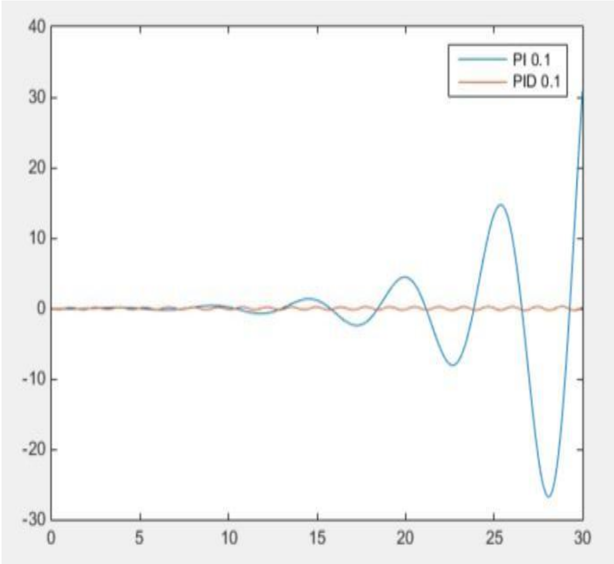


Figure 1: T vs f1:for 0.1 load

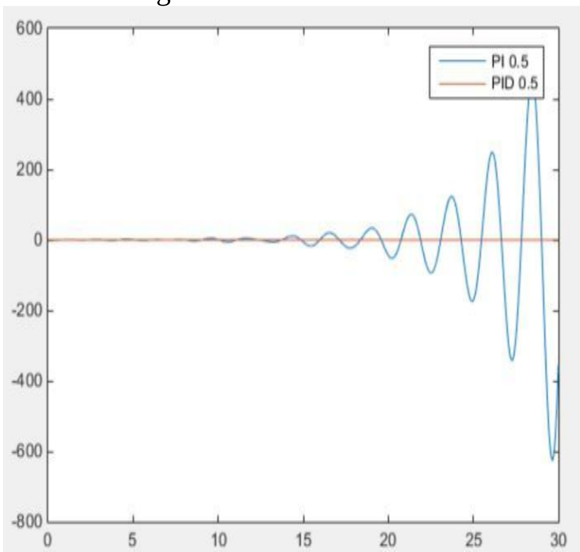


Figure 2:Tvs f1:for 0.5 load

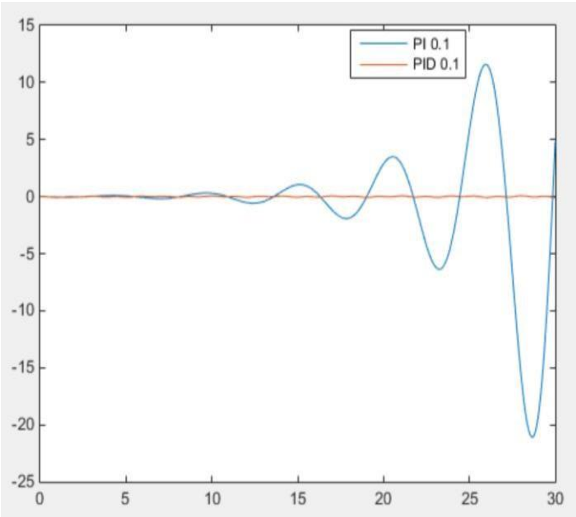


Figure 3:Tvs f2 : for 0.1 load

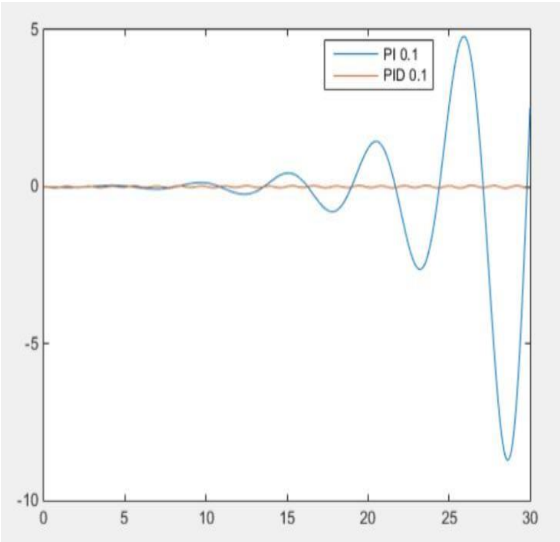


Figure 4:Tvs f2:for 0.5 load

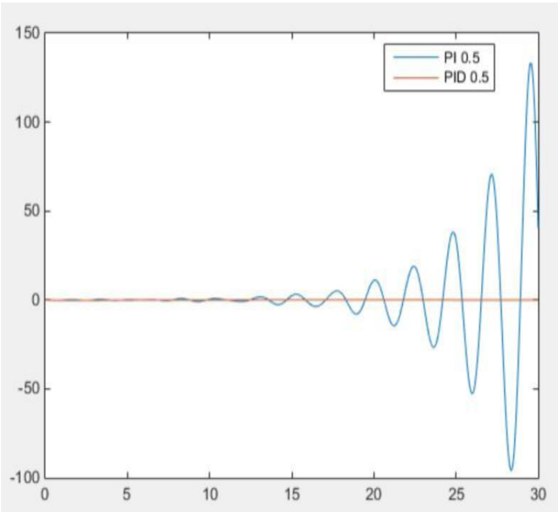


Figure 5:Tvstie:for 0.1 load

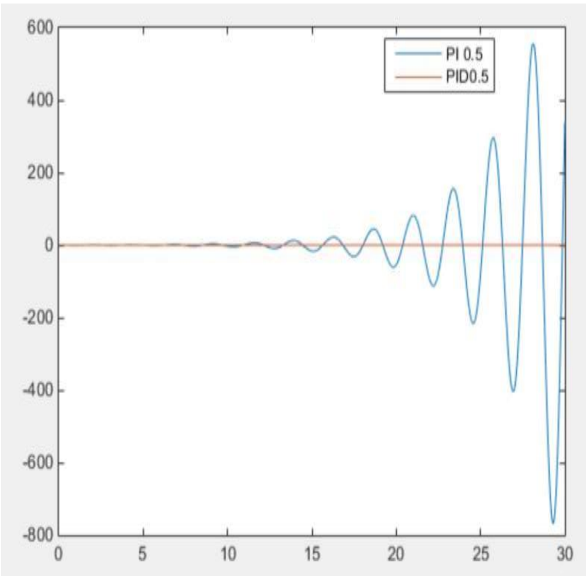


Figure 6:Tvstie:for 0.5 load

IV. CONCLUSION

Finally, controller parameters are tuned by using moth flame optimization algorithm for proposed model two area interconnected system for obtaining optimal values[5]. when comparing both PI and PID controllers the settling time of PID controller is more effective than PI controller in proposedmodel[6].

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