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Original Article

Automatic Power Adjustment by Means of Flexible Tools for Controlling the Control Based on the Ratio of the Two Systems in a Stochastic Resonance

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ABSTRACT

In this paper a method for automatic power regulation, with the Elimination of the two-mass system provide winding of volatility has been eaten. Intensification ratio control method is effective in controlling system of two mass. Intensification ratio control method is effective in controlling system of two mass. In this method, the intensification of the frequency ratio between the motor and the shaft torque feedback automatically according to the image (s) have been estimated for reaction with the torque reactions are determined by a clear picture-maker is estimated position (PSD). Accordingly, in estimating the parameters do not need to diagnostic and information with particular accuracy of bolt corrosion in the hands of will. Move the system to be compatible with the environment by having a torque reaction force sensor, a picture can be observed. Automatic power regulation system based on PD control than conventional and controlling is intensifying. In this article, determine the method of optimum PMU pole studied and are caused by the environment, the control of producer-driven disorders by observation axis and will discussed without it. Automatic power regulation system, proposed in the present article, may be narrow and quench internal screw Torque with recipe and photos are also eaten with input of external resources to match the unknown forgive fulfillment. The results of numerical simulation and the possibility of combining the proposed method shows.

Keywords: Producer control, Flexible tools, Automatic Power.

Introduction

Text with the control of the powerful methods of increasing development, higher levels of motor control in the field of applied realization will find. In the field of new technology, the need to move faster and be more felt. In the continuation of the discussion, in the field of spatial tools for controlling the robot, this need is felt due to the high transport costs should be controlling, weight decreased, but this weight loss system is decreased hardness. As a result, small and controlling to causing vibration and motor response may be getting worse. To resolve this issue, several control method for limiting vibrations and vibration is mentioned in the references. Intensification ratio control is one of the most suitable system is two mass control. In this method, a high resolution picture of torque with instructions will be estimated, even if it is not installed on the sensor axis and torque feedback has reactions on image intensification ratio, estimated to control makes possible the accuracy of this method is already in the article is confirmed. Currently, the control of the robot which are associated with a change in the environment to become a big problem has been in industrial applications. Concurrent execution of control will be launched in the creation of the position of power and control is a serious problem, various power control methods for flexible control tools have been proposed or the reference in stability and stability, chiou Shahin poor tools for controlling flexibility have been imposed have been evaluated. They believe that the main cause of the tear is a dynamic flexibility. Matsuno and his colleagues in the reference on the hybrid control of a flexible static-like producer tools with two degrees of freedom to win than with static (static) contact between the force and change its acoustic velocities, they talk Yashikawa and his colleagues in the power control algorithm for reference and the hybrid combination mode with a very flexible tools for controlling the system raised the power, though controlling of interaction resources in flexible controlling tool tip In other words, they moved to the control systems should the environment of image forces controlling the reaction time. Scientific research on auto-regulation controlling very flexible tool resources is limited. This article is a power auto-adjustment method with narrow fluctuations of pitch based on a dual system failed/control is provided from intensifying. In accordance with the torque reference image response, using a sensitive State duck are estimated (PSD). A PSD is so far include a simulation of the sensor of the camera case and one is LED in their systems the power regulation, the power to command as part of the axis of disorder will be referred to by the view axis disorders (sensor head) without the power sensor axis disorders shall be observed. Automatic power regulation system based on PD control than conventional intensifying controlling and determination method of optimum PMU are discussed, as well as poles. For realization of the law of action and reaction, finding the photo reference resources we chosen to be zero.

A model of flexible tools for controlling

A model of flexible tools for controlling formation (1) has been shown.

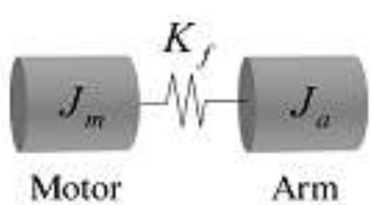

Figure 1.

Dynamic behavior

of flexible controlling tool for a system of two equations for stochastic dynamic in Commons is described as following:

$$J_m\ddot{\theta}_m = \tau_m - \tau_{reac} - \tau_{dism}$$

$$\tau_{reac} = K_f(\theta_m - \theta_a)$$

$$J_a\ddot{\theta}_a = \tau_{reac} - \tau_{dism}$$

Table 1. All the parameters used in this article

$k_f = 50$ Spring coefficient.	$j_a = 0.24kgm^2$ Ainersi axis	$j_m = 0.02kgm^2$ Ainersi motor
τ_m Input torque	θ_a Angle of the axis	θ_m Motor angle
τ_{disa} Torque arm disorder	τ_{dism} Torque axis disorders	τ_{reac} Torque reverse action
$k_r = 20.8$ Using torque reverse action feedback	$k_V = 60$ Take advantage of the speed feedback	$k_p = 2.25$ The interest ratio
I The amount of flow	g See interest. $w_a = 15rad/s$ Resonance frequency axis	Nm/A $k_t = 3$ Effects of torque coefficient
Cmp Amounts equivalent to	ref Reference values	cmd The value of the command
a The Elimination of	m The motor	n Nominal amounts
gpd=600rad/s Cut off frequency derivative of Breathers	ga=80 rad/s If your head cut off frequency turbulence-driven (Viewer)	gdis=400rad/s If your head cut off frequency turbulence (Viewer)

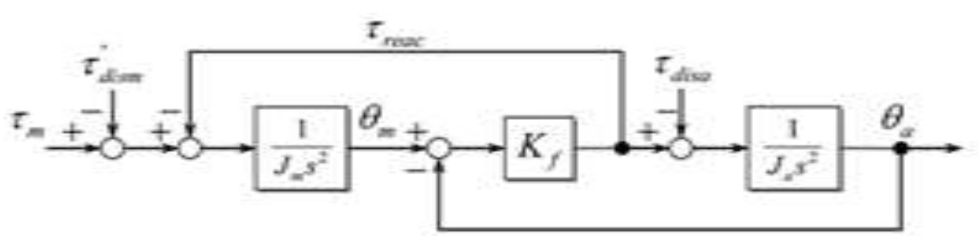

Figure 2

Speed control and intensification of the ratio control to view feeds in disorder (see full size if impaired)

High yield of controlling movements for greater skillsand moved a chalaki required. To reach such a high yield, times change in the movement against the system and the parameters to be resistant to tear. Sabanovic in reference [8], which has been controlling the speed, as the cause a vibration mode analysis of strong motion system with folks, is control. A view of absorbed by his colleagues and ohishi has been proposed [10]-[9], a good proposal for achieving high control speed.

A view of total mechanical load and torque disturbance, a change of parameter and specify the diagnosis, in other words to determine the torque and power to control movement disorder patient and the realization of the various applications is essential in controlling the speed of this, which is based on a view in the practice of their disorder is introduced. A view of the torque for the disorder regardless of the time of most rapid possible disruption is designed. Estimated impairment of torque response speed θ°_{m} and the reference flow I_{ref} in figure (3) has been shown.

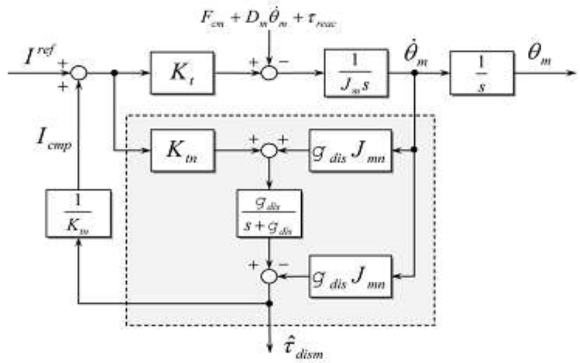

Figure (3)

Torque disturbance τ_{dism} will be shown as follows:

$$\tau_{dism} = (J_m - J_{mn})\ddot{\theta}_m + (K_{tn} - K_t)I^{ref} + F_{Cm} + D_m\dot{\theta}_m + \tau_{reac}$$

In the equation (4), the first phrase changes induced torque is the torque ainersi second, the phrase itself that vibrations caused by the torque coefficient of variation is. The third and fourth words to the colon and is a significant force with stickiness. The last phrase of a recipe, as well as photographs of the torque set is centered. Equation (5) shows that the torque of the admonition by the turbulences of the first low-pass filter will be estimated. Low-pass filter cut frequency g_{dis} specifies the estimated impairment of the torque equation (5) for the realization of the strong movement control is used and controlling strong motor, motor system as that speed control system in shape (3) has been shown. As in shape (3) shown, the effects of the disorder, as torque conversion function G_s equation (6) and (7) shows.

$$\hat{\tau}_{dis} = \frac{\frac{J_{mn}}{J_m} g_{dis}}{s + \frac{K_t}{K_{tn}} \frac{J_{mn}}{J_m} g_{dis}} \tau_{dis}$$

$$G_s = \frac{s}{s + g^{*}_{dis}} \tau_{dis}$$

$$g^{*}_{dis} = \frac{K_t}{K_{tn}} \frac{J_{mn}}{J_m} g_{dis}$$

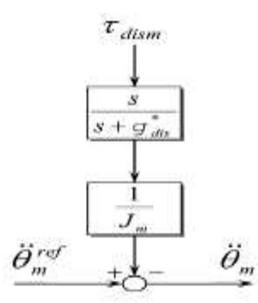

Figure (4)

3-1. Estimation of torque-sensitive mechanism by applying a clear picture of the State

In this section, with photographs of the torque reaction using a PSD that was shown can be estimated. If the top of the camera to be installed in either tools, PSD, PSD repair of camera in space is a problem. Of the camera, install and run the engine on the PSD drive is laid out axle on one also LED the way downward (6). A controlling tool along with the PSD in shape (4) has been shown. PSD camera angle difference engine and axle measurement is measured by the angle of the PSD for the relationship (8) has been defined. If it was already spring coefficient, photographs of the torque reaction relationship (9) shall be estimated:

$$\theta_{psd} = \theta_a - \theta_m$$

$$\hat{\tau}_{reac} = K_{fn}\theta_{psd}$$

Torque feedback reverse action

In this article, one of the intensification of the ratio control method for vibration control of two-mass system limited is to act is taken. This resulted in the intensification of the frequency ratio method and frequency counter that selectively according to the intensification of the feedback has reactions-estimated fact torque, will be determined. Block diagram of the torque feedback form in the image guidelines figure (5) is displayed. Here, with a picture of torque feedback guidelines introduce kv system. Photo guidelines-torque have been estimated, the one is the engine speed control system by feedback on specifications. When the system is $K_r = j_m^{-1}$ shown in the figure (5), not in its control system figure (6) will be displayed, equivalent.

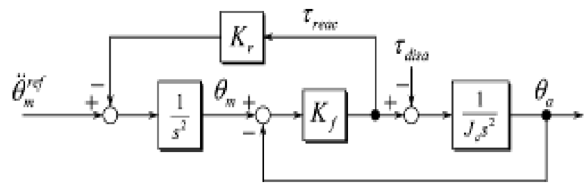

Figure (5)

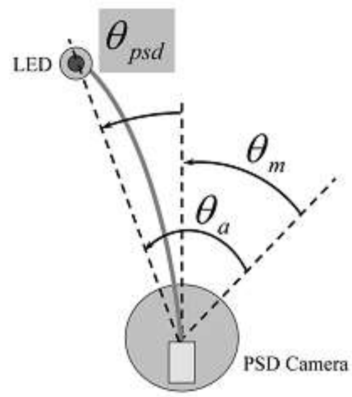

Figure (6)

The transfer function $\ddot{\theta}_{ref}$ to θ_a, θ_m has been shown like equations (10) and (11).

1. $$\theta_m = \frac{J_a s^2 + K_f}{J_a S^2 + K_f(1 + K_\tau J_a)s}\frac{1}{2}\ddot{\theta}_m^{ref}$$

2. $$\theta_a = \frac{K_f}{J_a S^2 + K_f}\theta_m$$

Here, the frequency of resonance frequency w_m and the resonance of the driven motor mode is determined as follows:

3. $$\omega_m = \sqrt{\frac{k_f}{J_a}}(1 + K_\tau J_a)$$

4. $$\omega_a = \sqrt{\frac{k_f}{J_a}}$$

The ratio of the intensification of the k is defined as follows:

5. $$K = \frac{\omega_m}{\omega_a}$$

w_a According to the controlled equipment shall be determined according to the desired parameters cannot be included. On the other hand w_a image by controlling the reaction torque feedback has been, folks. Loss of torque screwdriver instructions of photos eaten turbulence-driven, drawing four rings in the following feedback on the following:

-Disturbance compensation by disturbance observer

-Stop the vibration (vibration) eaten by the torque screwdriver instructions photo feedback

-Set your resources based on the estimation of the entropy-driven

-Non-linear compensation of turbulence on the one hand driven by disturbance observer

Estimation of the entropy-driven

In this article, we set the vibration strength we have raised with the stop after they were set into your resources-driven turbulence driven by turbulence can be seen axis Viewer [7]. Dynamic system equation resonance (resonance) mass according to the following two relations:

6. $$\tau_{disa} = \tau_{reac} - J_a \ddot{\theta}_a$$

Estimation of the entropy-driven recipe and image acceleration torque shaft block diagram can be estimated based on the entropy figure (7) has been shown.

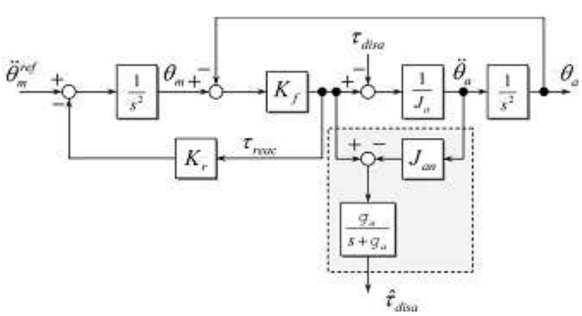

Figure (7)

High frequency noise to reduce turbulence-driven low-pass filter of the first batch will be observed. Low-pass filter cut frequency ga's are clear.

Set your resources controlling

To set your profile in this article on the basis of constant intensification of your resources controlling has been proposed in the proposed set figure (8) has been shown.

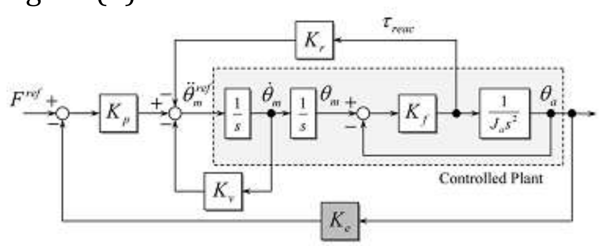

Figure (8)

Here the T_{dism} turbulence by torque disturbance compensation Viewer, and turbulence driven by the entropy-driven Viewer is not accepted. The environment is strength-based. F_{ref} reference resources to function in response to the force (16) is shown:

7. $$\frac{F^{res}}{F^{ref}} = \frac{K_p K_e \omega_a^2}{\delta^4 + K_\upsilon \delta^3 + \omega_m^2 \delta^2 + K_\upsilon \omega_a^2 \delta + K_p K_e \omega_a^2}$$

8. $$\frac{F^{res}}{F^{ref}} = G_1(\delta) G_2(\delta)$$

G1 G2 conversion functions, coefficientsof miraei characteristic of that second category is completed with their first swinging are filtered. The proposed system characteristic equation for the relationship (18) is:

9. $$s^4 + K\upsilon s^3 + \omega_m^2 s^2 + K\upsilon \omega_a^2 s + K_p K_e \omega_a^2$$

Using the second batch conversion functions G2, G1 characteristic transfer function equation for the equation (19) shall be expressed:

10. $$\left(\delta^2+2\zeta_1\omega_1+\zeta_1\omega_2\omega_1^2\right) = \delta^4+2\left(\zeta_1\omega_1+\varsigma_2\omega_2\right)\delta^3+\left(\omega_1^2+\omega_2^2+4\zeta_1\omega_1\omega_2\right)\delta^2 \; 2\left(\zeta_1\omega_1\omega_2^2+\zeta_2\omega_2\omega_1^2\right)\delta+\omega_1^2\omega_2^2$$

Hence, the equation (19) against (18) is in the analysis of the relationship between equations for the following:

11. $$K_\upsilon = 2(\zeta)$$

12. $$\omega_m^2 = \omega_1^2+\omega_2^2+4\zeta_1\zeta_2\omega_1\omega_2$$

13. $$K_\upsilon\omega_a^2 = 2\left(\zeta_1\omega_1\omega_2^2+\zeta_2\omega_2\omega_1^2\right)$$

14. $$K_pK_e\omega_a^2 = \omega_1^2\omega_2^2$$

$\zeta = \zeta_2 = 1$ and $\omega_1\omega_2 = \omega_a^2$ the outcome of the relationship (24) in addition

$$\omega_1 = \omega_2 = \omega_a$$

to the maximum bandwidth control system.

15. $$\omega_m^2 = \omega_1^2+\omega_2^2+4\omega_1\omega_2$$

The characteristic equation ω_a and 4 times the amount:

16. $$\omega_m^2 = 6\omega_a^2$$

Hence,the constant aggravation for the equation (26) shall be expressed:

17. $$K = \sqrt{6} = 2.449$$

Theseequations are significant tothe steady intensification

of this unique value $\sqrt{6}$ is set when its resources for intensification of the two mass system run. Efficiency in the form of the equations (27) and (28) and (29) shall be expressed:

18. $$K_p = \frac{\omega_a^2}{K_e}$$

19. $$K_\upsilon = 4\omega_a$$

20. $$K_r = \frac{5}{J_a}$$

Hence, the model used in this paper is very simple and is extremely controlling and running the proposed ranking method proposed in t he application. Industrial is easy. In other words, in this article, to an affiliate without the motor controlling the strength and is compatible with the environment we have. In order to understand the law of action and reaction, the reference should be to force image the amount of equation (30) is planning:

21. $$F^{ref} = 0$$

Energy from the turbulence will be part of the steering control system of its regulatory

resources; power picture recipe around (the environment) is.

7. Axis compensation turbulence

Turbulence-driven by a torque estimation of image feedback reactions on the part of the axis of the motor system is the compensation f unction in the Fref to Fref equation (17) has been shown. T_{dism} function to F_{ref} in EQ (31) has been shown to:

22. $$\frac{F^{ref}}{\tau_{disa}} = \frac{\frac{1}{J_a}K_e\left(\delta^2+K_\upsilon\delta K_rK_f\right)}{\delta^4+K_\upsilon\delta^3+\omega_m^2\delta^2+K_\upsilon\omega_a^2\delta+K_pK_e\omega_a^2}$$

So for T_{dism} to F_{ref} system to reverse relationship (32) shall be expressed:

23. $$\frac{F^{ref}}{\tau_{disa}} = \frac{\delta^2+K_\upsilon\delta+K_rK_f}{K_pK_f}$$

Compensation of turbulence-driven briefly in figure (9) has been shown to your resources controlling of all set in figure (10) has been shown.

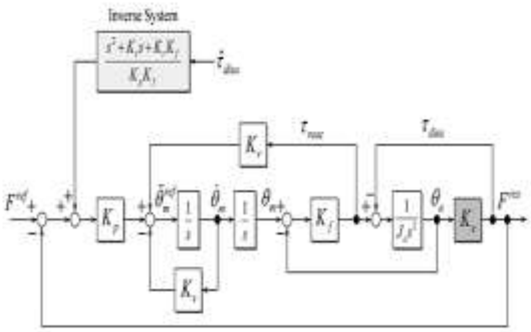

Figure (9)

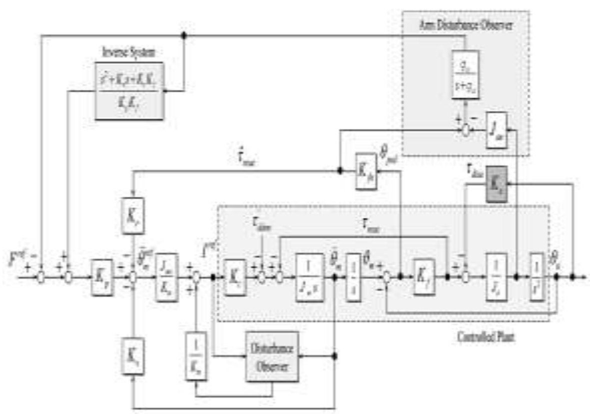

Figure (10)

The results of simulation

If the proposed method of numerical simulation for confirmation despite the absence of torque feedback photos recipe is done. The power of command (in order), are the centerpiece of the entrance of the gradual disturbance have been shown. Experiment parameter in table 1 comes. Sampling time is 1ms.

N 0.5	1s
1N	2s
0.5N	3s

Shape (11) simulation results without the torque feedback photograph shows its recipe (11) shows the results of this situation are the vibration energy and input energy of that. Manual are to be changed by the viewer are seen turbulence-driven thus being eaten because of the complex picture of torque reaction by disturbance compensation and Viewer. Torque nuts are eaten from turbulence-driven simulation results cannot be recognized by a constant control of the intensification of the formation (12) is shown in the proposed method of pitch vibrations and have eaten all their regulatory resources stopped the realization are assumed. Hence, the input power of the hand can function with the situation that followed. (Intervals figure (12), (11) are a sec).

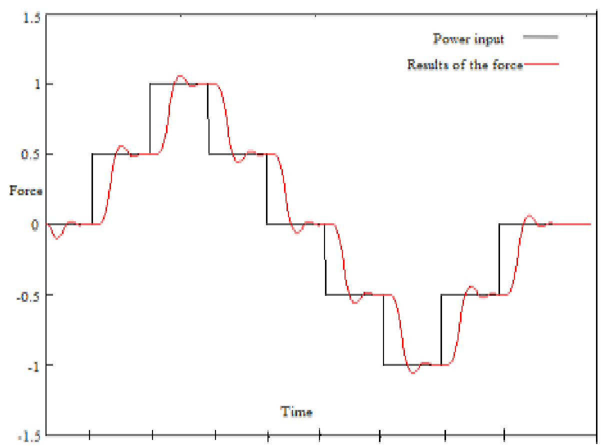

Figure (11)

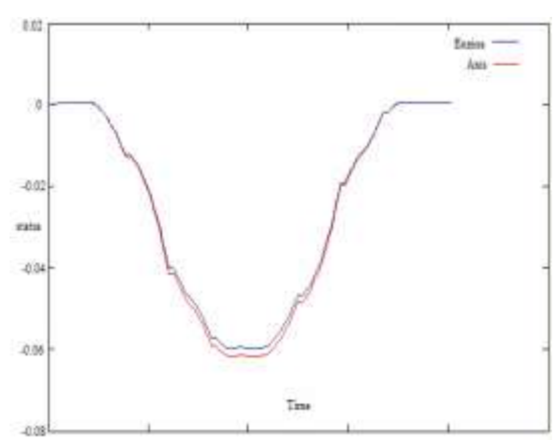

Figure (12)

The results of the power control

In order to explain the performance of vibration stop under the same reference resources, the results of the experiment the power control on the form (13 (shown in the reference resources is 2N (13) the results of the tests without the torque feedback photos show horses in the shape of the power (14) is seen outside, and this is due to the vibration modes that are not compensated some shock vibrations (vibration of small) there is stability in close and that compensation due to stability did not occur Could not be achieved. The results of the proposed resources by controlling vibration based on the constant control of the intensification of the formation (15) and (16) are shown. Torque control screw is fixed by applying image intensification of failed compensation theory has been well is stopped. Noise in the results of the experiment will be observed for reduction of noise should feel his status-status by the encoder shaft (shaft encoder that can specify status) will be measured is the proposed control system that does not have a feedback loop mode, get around the shape of the earthquake will be OK. As a conclusion the proposed control system can stop the internal screw Torque of environment regulation and failed to detect the unknown. (Is 0.5 s intervals).

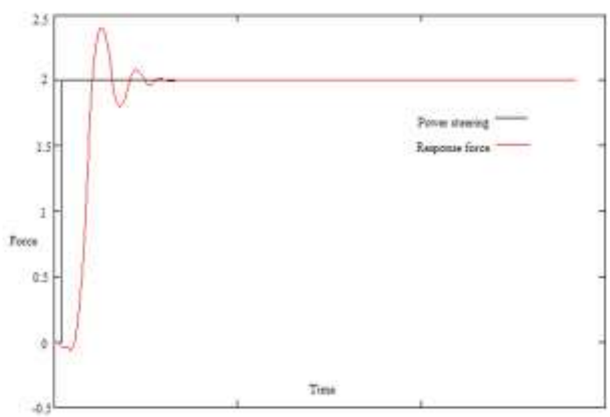

Figure (13)

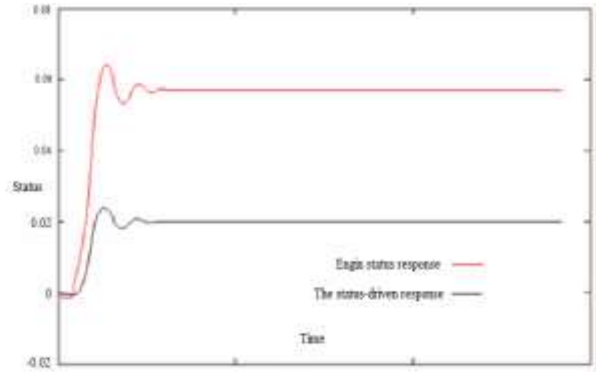

Figure (14)

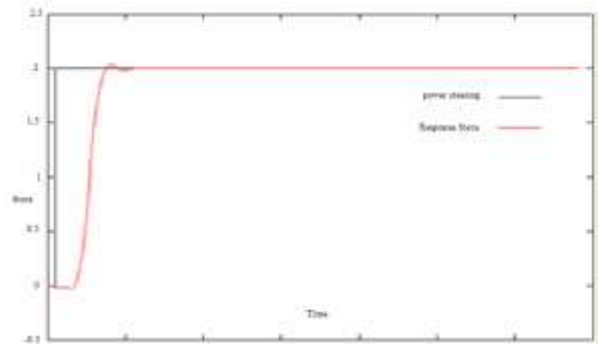

Figure (15)

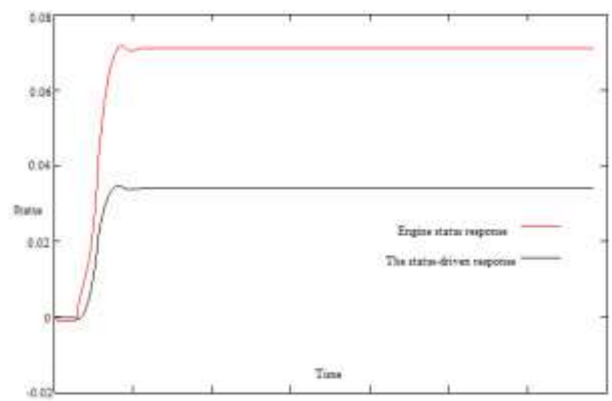

Figure (16)

Conclusion

If you set your manual changes by force, on the basis of constant intensification of control we see. Constant control of the intensification of the torque the torque reaction photo needs exact recipe image by PSD has been estimated in this study for estimation method of parametric identification does not necessary. it is not necessary to place the effect with the button in the power of the regulatory strength of turbulence are steering. Turbulence-driven turbulence will be seen by the viewer's own resources proposed regulatory system on the basis of constant intensification of control and controlling is PD. We have raised the pole and alternative methods when you set your system resources of two Stochastic Resonance (intensity of the results) will run a constant unique to the intensification was determined. Hence, the reference was put in the zero force, reaching zero value due to being dependent on human beings or the environment. As a conclusion the proposed set your power system can stop the image guidelines and internal screw Torque eaten input of external resources is the anonymous identification feature of the experimental and numerical results the proposed method shows the shelf-life. There is a very simple structure of the whole system and the quake (vibration) of the proposed method by the well axis is stopped.

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