ISSN: 1987-6521, E-ISSN: 2346-7541
DECEMBER 2022 VOLUME 59 ISSUE 01
COMMENTARY ARTICLE
© THE BALTIC SCIENTIFIC JOURNALS
BLACK SEA
SCIENTIFIC JOURNAL OF ACADEMIC RESEARCH

DYNAMICS OF FORCED OSCILLATIONS IN NONLINEAR SYSTEMS

Jafarov Senan

Department of Management and System Engineering, Azerbaijan State University of Oil and Industry, Baku, Azerbaijan

Email: senan_jaf@rambler.ru

Received: 22-Mar-2022, Manuscript No. BSSJAR-22-58022; **Editor assigned:** 24-Mar-2022, PreQC No. BSSJAR-22-58022(PQ); **Reviewed:** 05-Apr-2022, QC No. BSSJAR-22-58022; **Revised:** 07-Apr-2022, Manuscript No. BSSJAR-22-58022(R); **Published:** 14-Apr-2022, DOI: 10.36962/GBSSJAR/59.1.005

DESCRIPTION

Various ways and means are currently being used to intensify processes, with vibration being one of them. Performed experiments and acquired findings suggest that low frequency (20-100 Hz) vibration can be utilized to intensify most technology processes (for example, mixing liquid and solid substances, melting metals, and so on). Different devices are utilized to obtain the low frequency vibration. The electromagnetic exciter is a device with a greater scope and efficiency. One phase-single-cycle, three phase-single-cycles, and one phase-two-cycle devices are all possible. On technical and economic metrics, the single phase single-cycle electromagnetic exciter is one of the most useful options. It is made up of an electromagnet, an armature with springs, a coil, and a capacitor connected in series to the coil.

Exciter operating on low frequency (20-100 Hz) mechanical fluctuation is the one phase electromagnetic exciter connected to standard supply *via* capacitor series connected to its coil. An efficiency of given device is the rational forming of the attracting force on main mechanical fluctuation frequency.

The system under consideration is made up of two oscillation circuits (electrical and mechanical) that function in a forced fluctuation mode, which is formed in the mechanical section. As a result, vibration characteristics (amplitude, frequency, and phase) are influenced by mechanical system and load factors. Taking into account all of the variables that affect the operation of the electromagnetic exciter, on the other hand, makes determining the mechanical system's primary characteristics more difficult. As a result, we must accept the following requirements in order to achieve the mathematical dependency for straightforward analysis.

A) Energy losses on eddy current should be very low;

B) Inductivity should be nonlinear function of moving and other parameters of system should stay stable;

C) Magnetic system should be saturated and should have not hysteresis/taking into account these conditions the investigated electromagnetic exciter system.

Given that the mathematical model of the Electromagnetic Exciter (EE) is a nonlinear differential equation system, computer modelling is the most versatile tool for solving dynamic problems. Given that the mathematical model of EE is a nonlinear differential equation system, computer modelling is the most widely used tool for resolving dynamic problems. Application programmes (Win Fact and Mat Lab) for modelling and optimization of Dynamic Systems are used to analyse the transition process on EE (DSMO).

During modelling, the systems cross from one mode to another significantly different mode based on baseline conditions. The initial condition of zero causes the armature of an electromagnet to move in a "cyclical" mode that corresponds to the frequency of the network supply. In a different situation, the system switches to "probably mode" with more speed. In a separate set of circumstances, the system switches to a faster "roughly cyclical" mode. So, for example on modeling of motion in “cyclical” mode during 0.05 sec armature vibrates with amplitude 0.14 mm and with speed 0.4 m/sec., Fluctuations of current in supply circuit in both case are same, so “approximately cyclical” mode count as more profitable in terms of technology.

For calculation of established motion of EE we integrate and write dynamic equation of its equivalent electrical circuit. Herewith the dynamic equation of mechanical part can be simplify *via* excluding the very small second term of expression for electromagnet force that is proved on modeling of transition process of EE. Besides, the distance equation that unifying mechanical and electrical parts of system should be wrote as L=L (z).

The settings of the system's parameters were set for the EE's established operating mode. The following change parameters were accepted: A=0,5...2,0 mm and U=20...230 V. Increasing the amplitude of current on frequency causes the amplitude of fluctuations at the output to increase, giving us the ability to regulate the amplitude of fluctuations via voltage. However, there is no explanation for the amount effect of such an auto parametric stimulating of electromechanical system fluctuations model. As a result, the present harmonic in the difference frequency has modest amplitude, which is proportional to the computational error.

Citation: Senan J. (2022). Dynamics of forced oscillations in nonlinear systems. GBSSJAR. 59(1), 1-5. DOI: 10.36962/gbssjar/59.1.005