Making resistant the cylindrical tanks by intelligent material piezoelectric against earthquake

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Abstract

In this article we discuss about making resistant the cylindrical tanks against earthquake by reducing vibration and how to prevent happening the aggravation frequency by smart material piezoelectric as ring and stringers that is causing the collapse of structure shifting and forms of the tank is calculated by Lagrange equations. The advantage of piezoelectric is that used either as a sensor or as a fix and function noting to the feature of these material is they are given a deformation it caused to making a voltage and if they are given. An small amount of voltage it causes to make a deformation in these material. So by using them in tanks crust as ring and connect it to a controlling system, in each moment we can enter some voltage that reaction against the continuous moment et the thanks crust and by reducing amount of vibration make the desired structure damping. If the earthquake frequency is limited to low only ring are activated by sensors and due to more shifting string are activated by electricity automatically. In this problem, three parameter in clouding tank shifting in angle and ray and amount of voltage given to the smart material in each moment are unknown in system. That are accounted by parametric space methods in order to stability and useful function in controlling system noting to analytic computations of the frequency limitation tanks forms and its stability ultimately this method is also computed by computer simulating that the results are together with little difference. Due to the recent earthquake that causes rains in petroleum tanks and radioactive material storage in power station, this method and its usage will be very use useful and inevitable.

Key words: piezoelectric – earthquake - cylindrical tanks

۱. Introduction:

Shells of the abundant variety of building form are found in our physical world. The cylindrical shell type structures are used in many engineering applications such as pressure vessels, storage tank, marine structure, space structure, fuselage, and the submarine hull. A shell can be defined as a shell enclosed between to curves. The distance between these two levels is shell thickness. Development of this structure in various fields has caused more detailed study of their mechanical behavior. One of the important issues in the mechanical behavior of shell is the "buckling". If the pressures force, and when it reaches a certain amount of force per change in shell, significant form will create and the building a shell loses its first case. This situation is called a shell buckling. Form a scientific point, design and analysis of the shell is extremely important. Stability of shell is very important due to the two properties form the crust. First, the shell thickness is small compared to the other dimensions, and second, types of shell structure under which these forces are forces in the field of compression structure are created. Because these two reason, the shells are in danger of bucking.

2. Definition the problem

On shells, create action is not always synonymous with fall and loss of building shell and often, the shell will have the load-bearing capacity after buckling load, but in terms of engineering, creating a shell buckling is considered a precursor to dementia. From point of scientific and engineering view, buckling phenomenon which is generally before the onset of large deformation, means in the sense when seems by naked eye with no structural change of change in form to obtain a reinforced cylindrical shell relations shown in figure 1. It is necessary that several fundamental assumptions take place. Shell reinforced a shell is isothere and thin skin that is closed in the end and to consider as a cylindrical shell with a terminal condition. The shell material and amplifier are the elastic properties, the shell by uniform thickness H, radius R, and length L, elasticity sample E, ratio pervasion V, cutting model G, In the general mode, the shell has the transverse amplifier (ring) N and longitudinal amplifier (stringer) that the amplifier can to be inside or outside of shell based on the figure 1. Junction of the amplifier and shell is assumed as line (connection line). This assumption is

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