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J Aeronaut Aerospace Eng 2017, 6:2(Suppl)
http://dx.doi.org/10.4172/2168-9792-C1-017

3rd International Conference and Exhibition on

Satellite & Space Missions

May 11-13, 2017 Barcelona, Spain

The average change of the total energy of binary neutron star system due to the emission of gravitational waves with considering mass variation

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We have studied the amount of energy lost via gravitational waves emission in the pre-supernova binary neutron star system (SN 1987A) in a time scale of one hour before the explosion event. We based our work on the Imshennik and Popov (1994) paper then we modified it by considering the mass variation using the famous Jeans-law and considering different values for the constant (from 1.4 to 4.4). Using our studied systems' data and with the aid of Mathematical programme, we got a relation between and the eccentricity which represents the G.W emission stage. We concluded from our curve that the sharp and maximum energy losses via gravitational waves happened at the high eccentricity values i.e. near the periastron position. Also the emission of G.W causes the orbit of the binary system to shrink until it become near circular orbit of e~0. We have extended our study by considering the variation of one companion mass of the binary according to Jeans law, the family of curves drawn for different n values indicates that for 1.4<1.47, a linear relation decreases with time τ. For 1.47, the curves tend to have curvature with a peak point which happens earlier as the value increases.

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Fuzzy control for stabilization and position of a nano-satellite

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In this work, we propose a control system based on a fuzzy control in order to counter the chaotic nano-satellite and position motion. The control is founded on the variation of angular acceleration from which the torque of an inertial system is modified. A disk and a DC motor compose the inertial system. We develop a fuzzy control algorithm for each axis, x, y. For each control algorithm, we include information in both directions x and y, and with their combination we get the control of the third axis. This control system can be adequate for using in low-orbit satellites. Through of an accelerometer, we obtain the information of the axis x, y. To test the fuzzy control proposed, we built a scale model with the standard dimensions of a CubeSat. In this scale model was included the inertial system with the accelerometer and the tests of the fuzzy control conducted were under conditions of gravity on the Earth's surface. The control variables are specified by the value given by the accelerometer as input variable, and the pulse width of the DC current as output variable. The processed information by the fuzzy control is sent to the DC motors, which handle the disks, generating the torque required to steady the chaotic and position of nano-satellite movement.

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