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Abstract–The study of transverse vibration of plates of variable thickness is very important in a wide variety of applications in the industry and engineering. In the present paper an attempt is made to calculate the natural frequencies of trapezoidal plate of variable thickness. Further, the paper presents a non-homogeneous, symmetric trapezoidal plate with parabolic varying thickness in both directions. The non-homogeneity in plate's material has been assumed to occur because of parabolic variation in density along the length of the plate. The governing differential equations have been achieved by Rayleigh–Ritz's technique. To attain the fundamental frequencies a two term deflection function with clamped simply–supported boundary condition has been considered. For the first two modes of vibration the effect of structural parameters such as taper constants, thermal gradient, non-homogeneity constant and aspect ratio has been examined. All the acquired numerical results are displayed graphically. Confirmation of results of the present study has been shown with authors published paper.

Abstract–A problem of reflection and transmission at an interface of two micropolar orthotropic piezoelectric solids is studied in the present investigation. The expressions for amplitude ratios of various reflected and transmitted waves corresponding to incidence of plane waves are obtained analytically and depicted graphically with angle of incidence. Effect of micropolarity and piezoelectric interactions on the reflected and transmitted waves are discussed numerically. Some particular cases of interest one also deduced.

Abstract–An analysis has been carried out to obtain the effect of MHD flow and heat transfer for upper-convected Maxwell fluid over a stretching sheet with Ohmic heating. The governing non-linear partial differential equations are transformed to a system of non-linear ordinary differential equations by using suitable similarity transformation. The transformed governing equation are solved numerically using the Runge–Kutta method. Using the shooting technique, the effects of magnetic field (Rem), Eckert number (Ec), Maxwell parameter (b), Prandtl number (Pr), and Ohmic heating parameter are examined.

Abstract–A method is proposed for scheduling of sensor accesses to the shared network in a networked control system. The proposed method chooses the optimal sequence online via minimization of state estimation error covariance. As solving the problem by evaluating the error covariance for each of possible ordered set of sensors is not practical for large systems, a convex optimization is proposed, which yields approximate, yet acceptable results. The state estimator is designed for the augmented system resulted via incorporation of communication sequence into the plant dynamics. Simulation experiment of a car suspension system is included in which the proposed method resulted promising improvement compared to a round robin scheduling.

Abstract–This paper presents the new simulation system for air conditioning. The system consists of two cooling/heating systems. The system is detected the ambient temperature fully automated, intelligently and without delay and then it compares that temperature with the optimum temperature which sets by the user; and if there will be a difference between the desired temperature and the temperature read by the temperature sensor thus it regulates the engine speed of one of the cooling/heating systems in such a manner that the ambient temperature will reach to the user normal and optimal temperature. The system is designed in such a way that the persons feel normal ambient temperature without any sense of heat and cold. Therefore, some characteristics such as the number of persons in the environment, opening and closing doors and windows and any factor that makes a possible change in ambient temperature, has no effect on the proper and optimal system implementation and the system will apply desired ambient temperature without any restrictions.

Opening in shear wall affects dynamic feature of system and if it not applied appropriately, it can break crisp on shear wall and decrease its efficiency. On the other hand, a mechanism could be designed that shear wall with opening show integrated behavior together and simultaneously, increase ductility and energy saving of system. In this paper, two 2D four-story and eight-story buildings has been modeled by OpenSees software. Opening effect on shear wall has been investigated and for improving behavior in different modes of link beam (weak, medium and deep) with and without opening has been evaluated. Results show that if weak link beam is used, structure resistance will decrease greatly that this decrease for four-story and eight-story buildings are 29 % and 55 % respectively. In medium link beam, in addition to the resistance decrease, link beams become ruptured. This case is visible in pushover diagram of four-story and eight-story frames. In deep beam mode, structure shows high resistance and its resistance decrease will be a little and because of appropriate mechanism for constituting plastic hinge in location, link beams show more ductility behavior.

Abstract–Great structures are facing problems such as corrosion and decay as a result of the passage of time and environmental factors. As these factors have significant impact on decreasing resistance, loading capacity and creating defect in structure members, there is need for necessary measures for improving structure performance. In this research, for investigating effect of Carbon fiber reinforced polymer (CFRP) sheets on reinforcing steel beams which has defect, 17 beams were studied for modeling by ABAQUS V6.11 software. It should be noted that in all these beams in mid-beam strengthening flange area, initial defect was created unidirectionally and bidirectionally, size and way of CFRP sheets positioning for improving beam performance was investigated. This paper determines appropriate performance of CFRP sheets in increasing loading capacity and preventing extension of crack in steel beam.

Abstract–With development in technology and increasing the cost of irreversible energies in the world, the use of reversible systems has been considerably progressed. This advancement requires deployment and increase in productivity of inverters. As a result, multilevel inverters were introduced and research on them was enhanced. Multilevel voltage inverters have the most application because of their low cost however; current source inverters due to less power loss for their gates in compare with voltage source inverters and significant reduction in harmonics have received considerable attention in recent years. In the topologies where AC output is controlled by independent current wave it can be considered as a current source inverter (CSI). This structure could be used in the industry and where industrial application with average (voltage platform with high quality) is necessary. Despite different VSIs techniques they never could completely smooth the wave form and sinusoidal output was not achieved. In order to connect them with small network and obtain smooth sinusoidal output, the CSIs have been used. In this research, we present a novel topology of current inverters and also implementation of SHE-PWM algorithm which is optimized with PSO algorithm, two reversible energy entrances for connection to small network and also connect to load are provided. In order to do this project, we used MATLAB/Simulink as software.

Abstract–In spite of the increasing popularity of computers and the rapid development of electronic information, problems regarding network and information security have been increasing as well. Thereby, the prevention of computer viruses is one of our top priorities. At present, the mainstream antivirus software is mainly applied in the prevention of computer viruses; however, there are defects in the software in searching and killing viruses. Based on the Web technology, this paper first introduces a platform consisting of Web subsystem, scheduling subsystem and scanning subsystem. Then, it introduces the realization and testing of the modules of the platform. Furthermore, this paper designs a set of integrated scheduling control system for third-party antivirus engine, which, to some extent, provides guarantee for centralized virus scanning in computer files.

Abstract–With the improvement of living standard, people tend to pay more attention to health after their material and spiritual needs are satisfied. Boxing as a high-consumption sport can not only improve reaction capacity and physical coordination but also protect self. This study designed a boxing training aid using MSP430 series single-chip microcomputer and module analysis was made on the hardware circuit and software program. The punch speed, striking force and reaction capacity of the subjects were accurately measured using the test system. Liquid-crystal display module was used to display measurement data and the obtained data were uploaded and stored to realize menu control. The test revealed that the boxing training aid with stable performance and rich function could make fitness training more convenient and intelligent.