title	Modeling, analysis and design of structural components subjected to severe loading conditions
name	Nilanjan Mitra
phone	756-7637
email	nmitra@calpoly.edu
additional	
department	Civil Engineering
proj_desc	Natural (earthquakes, tornadoes and tsunami) and man made (blast loading) hazards leaves behind a trail of destruction of property as well as infrastructural resources. In order to account for these loading conditions and create better design standards, it is necessary to do modeling and simulation of each of the vulnerable structural components. Typically for studying the inelastic response of these structural components two different approaches are considered: experimental and computational. Experimental research of structural components subjected to natural and/or man-made loading are typically destructive in nature, usually costly, requires lot of experimental equipments and also a lot of man-hours for manufacturing of the set-up. On the other hand, computational research requires a solid understanding of the theory involving the response mechanism of the structural component subjected to different type of loading conditions, without the need of costly equipments and man-hours for the project. Moreover, parametric evaluation for determining better design standards can be easily performed with computational methods rather than experimental methods within limited time and resource. The objective of the project would be to harness the advantages of both the procedures of experimental and computational methods in studying the response mechanism of structural components subjected to severe loading conditions. A database of past experimental investigations of a structural component subjected to extreme loading conditions would be accumulated. The accumulated experimental investigations would be computationally modeled using state-of-art simulation software and parametric investigations would be carried out to determine better design standards for the structural components subjected to severe loading conditions.
inter_desc	The work is inter-disciplinary in nature since it involves computational nonlinear finite elements. Both students in CE, ARCE, ME, AERO and BMED would be able to do the project. Students in CE, ARCE, ME, AERO and/or BMED would be users to computational software developed in-part by the project coordinator to model and simulate structural components subjected to severe loading conditions. Even though the application of computational modeling and simulation is in the area of CE and/or ARCE; however the technology learnt during the process would be helpful for students in ME, AERO and BMED to do computational structural analysis and design of mechanical, aerospace and biological components respectively. Students in CSC and/or MATH are also welcome who can develop software codes. With help from the project coordinator, students in CSC and/or MATH would be required to develop software codes for use with nonlinear finite element analysis of structures.
links	
students	2
majors	CE, ME, AERO, ARCE, BMED, CSC, MATH
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