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Abstract

Seismic Analysis of 3 Dimensionally Printed Structures

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Abstract:
Conventional construction of structures takes more time and labor, and hence there is a need for rapid and fast construction in today's world. Complex designs are expensive or rather not possible to construct due to the complexity in the design. Hence 3D printing is making its way into construction. A small structure can be 3D Printed in approximately 24Hrs. 3D printing is economical for various reasons. One such reason is due to the elimination of formwork and scaffolding required. The time required to complete a structure is also reduced in 3d Printing by several times. This plays a major role during disaster where it is important to provide shelter as quick as possible. Because of this it is also important that these structures are stable to external forces such as wind and earthquake forces. In this research scaled models of 3D printed structures are analyzed for seismic loads and previously recorded earthquake using Shake Table and in software. The Models are 3D printed using the free flow method for cement and a Creality Ender 3 for Polylactic acid (PLA). The models are 3D Printed to a scale of 1:30. The Models are subjected to Earthquake of previously recorded data of Bhuj and Uttarkashi. The accelerations in each floor of these models are recorded and the maximum acceleration is calculated. A plot of maximum acceleration versus no of floors is plotted. The results are then compared to identify the factor of difference between scaled models and the software analysis. Also as a part of the study a beam is modelled in SOLIDWORKS and finite element analysis is conducted for replicated 3D printed fibre reinforced concrete and Polylactic acid (PLA) models. The results of the same are discussed in the study.

Biography:
Poojith Prakash is a student of M Tech. Structural Engineering from Ramaiah Institute of technology, Bangalore, Karnataka, India. His area of interest is earthquake stability of structures and sustainable construction. He is currently working on the

seismic stability of 3 dimensionally printed structures. Prior to this he has worked on the use of bamboo as a reinforcing material in the manufacture of pavement blocks and have presented his research work in various intuitions.

Publication of speakers:

- Design for additive manufacturing process for a lightweight hydraulic manifold, Jul 2020
- Adoption and Diffusion of Disruptive Technologies: The Case of Additive Manufacturing in Medical Technology Industry in Australia, Apr 2020
- Introduction to Additive Manufacturing May 2019
- Metal AM Guidelines, May 2019
- Diegel, Douglas Dunn, Fidencio Neri, Eric Haugen, Eric Rynes, Alex Reynolds, Jemma Nelson, Audra Johnson, Mark Frerker, Michael Buckley, Rajinder Kaul, Wouter Meuleman, John A.Stamatoyannopoulos Nature. 2020; 583(7818): 729–736. Published online 2020 Jul 29.
- Diegel, Douglass Dunn, Mark Frerker, Michael Buckley, Rajinder Kaul, Ying Zheng, Jonathan Himmelfarb, Hannele Ruohola-Baker, Shreeram Akilesh
- EBioMedicine. 2019 Mar; 41: 427–442. Published online 2019 Mar 1.

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