Deformability of Circular Plated Joints in Single Layered Lattice Structures

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Single layered lattice structures such as geodesic domes have gained prominence in research as a result of their large deflection and post-buckling behaviour. Extensive studies have been conducted in the past on the joint components used in these structures. The most commonly used joints like welded hollow spherical joints (ball-nodes) have numerous investigations focussing on stiffness characteristics and their effect on the post-buckling behaviour of lattice domes. Circular plated joints have frequent application in geodesic domes, but research work on their behaviour and their effect on the dome are limited. The main factors influencing these joint characteristics are the relative dimensions of the members and joints, and the forces carried by the members at different locations of the structure. This study aims to establish a relation between the deformability of the circular plated joints, the dimensions of the joint and the forces from the connecting members. The numerical investigations are carried out by nonlinear finite element analysis of the joint considering material nonlinearity and contact surfaces in the commercial software ABAQUS. Conclusions on the type of failure and deformability of these joints under the different loading conditions will be presented based on the results of the numerical investigations. Recommendations on the design of circular plated joints will also be provided from the investigations. In future studies, these results can be applied to perform the post buckling analysis of single layer lattice domes with consideration deformation of joint plates.

Biography

Dr. Raghavan Ramalingam has completed his PhD from Indian Institute of Technology, Madras, India and have been working as a Assistant Professor at National Institute of Technology, Tiruchirappalli, India. His field of specialization is steel structures, stability of structures and structural mechanics. Sajith is working as a Research scholar under Dr. Raghavan Ramalingam for his Master of Science degree. He completed his bachelor of technology degree from Kerala University.

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Category: Poster presentation