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Analysis on progressive collapse resistance of Zhoukoudian single-layer latticed shell structure

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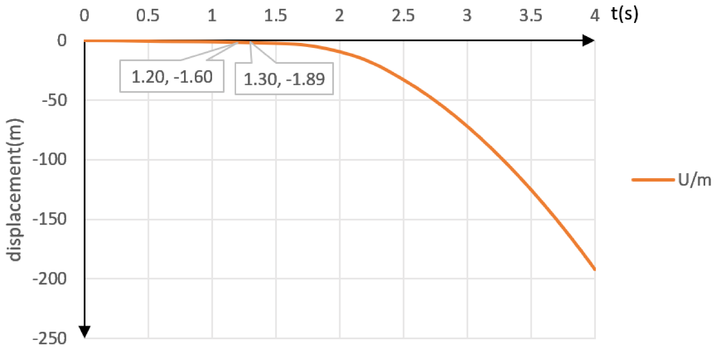
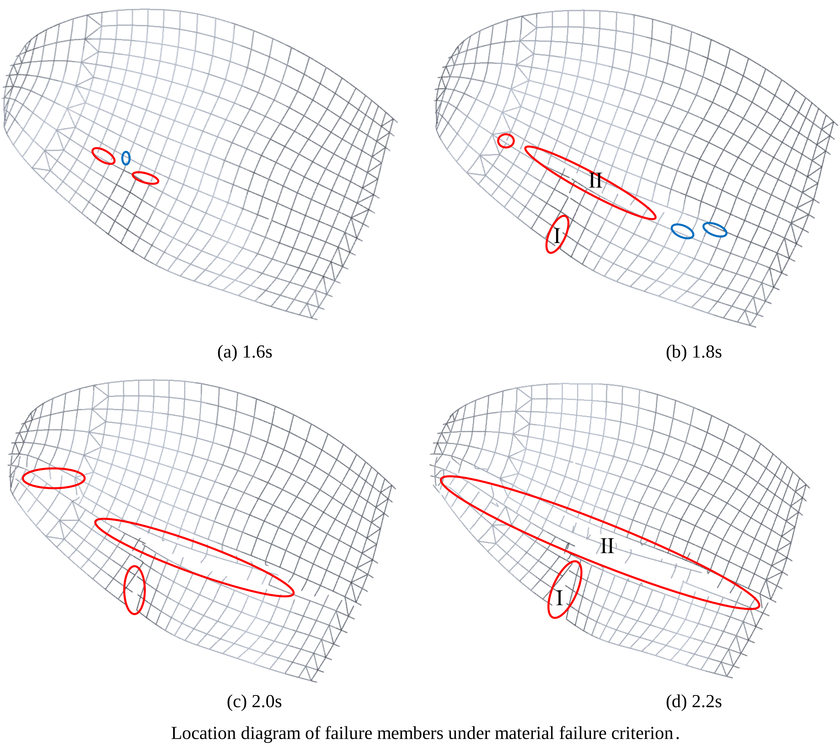
In this paper, the progressive collapse process of Zhoukoudian large-span single-layer space special-shaped steel reticulated shell structure is analyzed by means of numerical simulation. Using the double broken linear Kinematic Hardening Plasticity constitutive model established by ABAQUS to analyze the progressive collapse resistance performance of this single-layer latticed shell structure. The gravity load is used to simulate the load condition of the upper part of the structure, and the displacement criterion is used as the judgment criterion for the collapse of the structure.
The results show that the structure eventually collapse under 7 times the gravity load. The mid-span zone on the left side of the structure is the position where the curvature of the structure changes greatly, which is the weak point of the structure, and the first failed member appears in this zone. The failure members develop along the longitudinal and transverse directions of the structure starting from the mid-span zone on the left side, which eventually leads to the failure of the structure.



Displacement time history curve.



(a) 1.6s (b) 1.8s

(c) 2.0s (d) 2.2s

Location diagram of failure members under material failure criterion.