

Dynamic response behavior of subway station structure inputting forced displacement at bedrock varying number of CFT central columns

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The Daikai Station subway structure in Japan completely collapsed in the Hyogoken-Nanbu earthquake that occurred on January 17, 1995. Since it deformed in an approximately symmetrical manner with respect to shortened central columns, it might have experienced the catastrophic collapse due to a vertical impulse motion. To investigate the dynamic response behaviour of the structure due to sudden upward loading, a 3D elasto-plastic transient response analysis for the station having the central columns with concrete-filled steel tube (CFT) was conducted surcharging an isolated upward pulse-like displacement wave from the bedrock and varying number of the CFT. The results obtained from this study are: inputting the displacement wave with 5 ms duration and 4 m/s velocity, crush of the central columns may be effectively prevented by replacing RC structure with CFT one as the central columns.