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INVESTIGATION OF USING VARIOUS FORCE DISTRIBUTION METHODS AT SEISMIC BEHAVIOR OF STEEL MR FRAMES DESIGNED BY DDBD METHOD

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When a structure is subjected to a strong earthquake, seismic forces are distributed on the structure's floors. This is not the exact case when a designer designs a building by utilizing the forced-based design method. However, it is so clearly that distribution of the base shear obtained from Code's formula along the height of the building, significantly affects building's design elements. This results in different seismic behaviour during occurrence of strong earthquakes. Because this significant impacts on the structural performance, distribution of determined base shear along the height of the building are investigated via utilizing various current Codes. Regarding this, one can expect that a building which has passed all design criteria, during a strong earthquake presents unpredictable behaviour. In fact, as soon as the building crosses its elastic limit, the idea of using inertia-based distribution of lateral forces may be useless. Previous experiences confirm this so by this view cannot be expected to lead to optimal distribution of forces in the members of the building.

On the other hand, the force base design in the current codes does not predict conception of elements yielding and distribution of damages during loads beyond the elements elastic limits. Some researchers, including Priestley, believe that the appropriate distribution of base force at the height of the structure is more important than determining precisely the base force itself. As a result, one should be able to choose the pattern of earthquake distribution in such a way that the structure in the earthquake will endure the least damage. On the other words, formula of the code of practice for determining and distributing earthquake forces should result in an optimal building for various performance levels.

The main purpose of this study is to examine different distribution methods on several framing structures designed with a modified direct displacement base design method (Bahar & Esmaeil Abadi, 2017) in order to achieve an optimal and appropriate distribution of lateral forces. In this paper, a 16-floor steel structure has been designed based on DDBD, in which distribution of forces are based on three methods: (1) the Iran National Standard No. 2800, (2) American Society of Civil Engineers, ASCE 7-16, and (3) a new Code for the displacement based seismic design of structures (DDBD12). Behavior of buildings designed by these three force distributions formulas are compared together.

RESULTS

The result of having appropriate distribution in both structures which have been distributed by No. 2800 and ASCE7-16 at this structure's height was concluded.

Comparing the distribution of the shear base at the height of the structure, the amount of each floor's shear with increasing the height in the structure distributed according to the Iran National Standard No. 2800 as well as the American code were comparing with the structure distributed according to the rules of the DDBD12 were more uniform, and also the slope of the distribution pattern of the DBD12 regulation is more than the other two distribution methods.

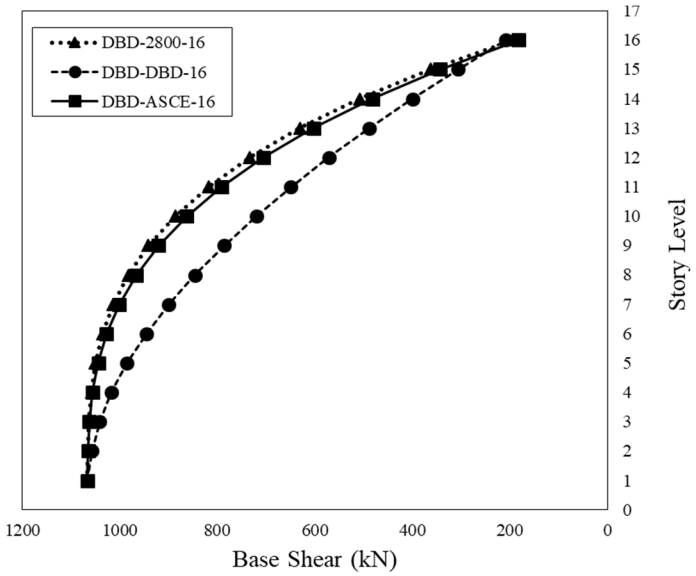

Figure 1. Distribution of base shear at the structure's stories with three types of distribution methods.

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