

EXPERIMENTAL STUDIES ON A NEW VISCOUS DAMPER AND DETERMINATION OF ITS MECHANICAL PROPERTIES

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Viscous damper are known as energy dissipating devices with high capacity in reducing seismic effect on buildings. Determination of mechanical characteristics of these devices is usually based on experimental studies on the device by using cyclic tests with different amplitude and frequencies.

In this work a new type of viscous damper in which the main body of the device is made of contractable steel bellows (developed in IIEES) is chosen for experimental studies. The test setup for this study shown in Figure 1.

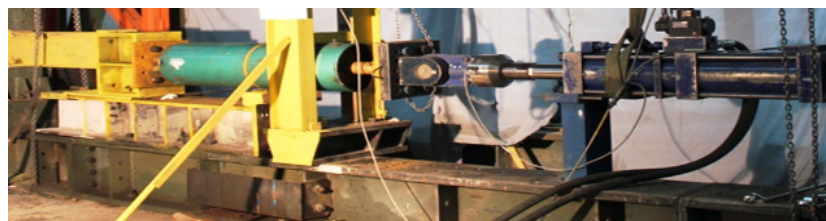
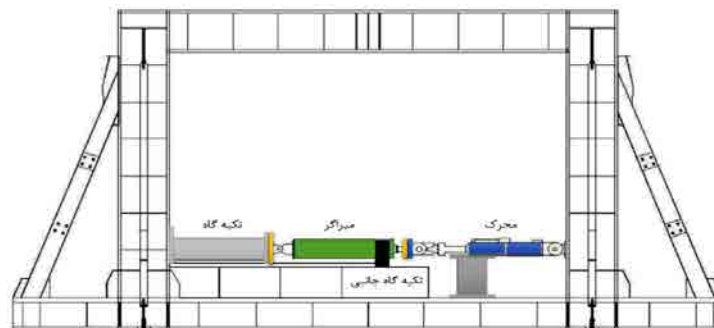


Figure 1. Test setup

The nominal force capacity of dashpot is 500 kN and its maximum stroke is around ± 150 millimeters. Due to the difficulties in providing hydraulic force with required frequency and amplitude the experiments on the device have been carried out quite slowly.

Table 1 shows the types of experiments that have been performed on the specimens. During the tests damper device has reached to a maximum axial force of 300 kN. The device has shown a nonlinear viscous behavior with respect to velocity. It also represents a small amount of friction type of dissipating forces during all the investigations.

Figure 2 shows the result of one of the actual test on devices according to the results of this investigation. A model for

representative the above viscous device should also include axial flexibility for the device in the form of Kelvin or Maxwell models.

Table 1. Specification of the applied loads

Loading Frequency (Hz)	Considered Displacement (mm)	Recorded Force (kN)
0.1	120	230
0.125	120	242
0.167	120	290
0.25	120	310

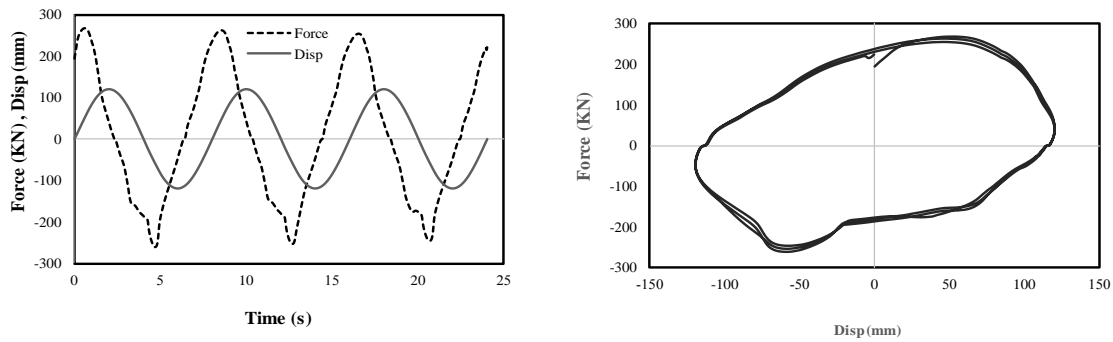


Figure 2. Force-displacement curve for 0.125 Hz frequency

Studies show that the friction force can be considered as an effective factor involved in energy dissipation of dampers. It is hoped that developing this damper, satisfy the demand of engineering society of IRAN for waste of energy devices.

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