INTISARI

Berbagai investigasi seismik telah mengidentifikasi benturan antara bangunan yang berdekatan sebagai salah satu bahaya utama, terutama karena jarak yang terbatas di antara bangunan. Oleh karena itu, penilaian risiko benturan seismik menjadi krusial dan harus dipertimbangkan dalam revisi peraturan desain bangunan di masa mendatang. Getaran *lateral* pada bangunan yang berdekatan dapat memicu respons torsi akibat benturan saat gempa. Penelitian ini bertujuan mengurangi dampak benturan antarbangunan beton bertulang melalui penggunaan *elastomer bearing*.

Studi ini mengevaluasi perilaku benturan pada bangunan-bangunan di Kota Surabaya yang dirancang berdasarkan peraturan lama tanpa memperhitungkan efek benturan. Penelitian ini mengkaji desain ketahanan gempa untuk struktur yang diperkuat, sesuai SNI 1726:2019, serta mengevaluasi bagaimana benturan antarbangunan mempengaruhi perilaku struktur dan efektivitas *elastomer bearing* dalam mereduksi dampak benturan. Analisis *nonlinear time history* dilakukan pada tiga bangunan berdekatan, menggunakan tiga pasang rekaman gempa yang diskalakan sesuai SNI 8899:2020, mewakili gempa *Megathrust*, *Benioff*, dan *Shallow Crustal*. Tiga model dianalisis: Model 1 tanpa elemen *link*, yang memungkinkan setiap bangunan bergerak bebas; Model 2 dengan *link* dan asumsi benturan beton dengan celah 50 mm; serta Model 3 dengan *link elastomer bearing* dan asumsi benturan dengan celah 9 mm.

Hasil penelitian menunjukkan penurunan nilai *mode shape* pada Model 2 dan 3 dibandingkan dengan Model 1. Penggunaan *elastomer bearing* terbukti efektif dalam mencegah benturan antarbangunan dan mengurangi gaya tumbukan (*link force*) dari 51.776 kN menjadi 4.899 kN. Dengan kapasitas *bearing* sebesar 6.276 kN, *elastomer bearing* mampu menahan gaya aksial yang bekerja. Secara keseluruhan, penggunaan *elastomer bearing* efektif mengurangi gaya tumbukan sebesar 58% hingga 91% pada berbagai jenis gempa. *Elastomer bearing* tidak hanya mencegah benturan antarbangunan tetapi juga mampu menahan gaya aksial, sehingga meningkatkan keselamatan dan integritas struktur beton bertulang yang berdekatan.

Kata kunci: *pounding effect, nonlinear time history, RC frame structure, elastomer bearing*

ABSTRACT

Various seismic investigations have identified collisions between adjacent buildings as one of the primary hazards, particularly due to limited separation distances. Therefore, assessing the risk of seismic collisions is crucial and should be considered in future revisions of building design regulations. Lateral vibrations in adjacent buildings can induce torsional responses due to impacts during earthquakes. This study aims to mitigate the impact of collisions between adjacent reinforced concrete buildings through the use of elastomer bearings.

The study evaluates the collision behavior of buildings in Surabaya, designed based on outdated regulations that did not account for collision effects. It examines earthquake-resistant designs for retrofitted structures in accordance with SNI 1726:2019 and evaluates how building collisions influence structural behavior and the effectiveness of elastomer bearings in reducing impact forces. A nonlinear time history analysis was conducted on three adjacent buildings using three sets of earthquake records scaled according to SNI 8899:2020, representing Megathrust, Benioff, and Shallow Crustal earthquakes. Three models were analyzed: Model 1, without any link elements, allowing each building to move freely; Model 2, with link elements and assuming concrete collisions with a 50 mm gap; and Model 3, incorporating elastomer bearing link elements with a 9 mm collision gap.

The results indicate a reduction in mode shape values in Models 2 and 3 compared to Model 1. The use of elastomer bearings was proven effective in preventing building collisions and reducing impact forces (link force) from 51,776 kN to 4,899 kN. With a bearing capacity of 6,276 kN, the elastomer bearings were able to withstand the axial forces applied. Overall, the application of elastomer bearings effectively reduced impact forces by 58% to 91% across various earthquake types. Elastomer bearings not only prevent collisions between adjacent buildings but also sustain axial forces, thereby enhancing the safety and structural integrity of adjacent reinforced concrete buildings.

***Keywords**: pounding effect, nonlinear time history, RC frame structure, elastomer bearing*