

ABSTRAK

Rahma Syahyu Br Hasibuan: *Pengaruh Base Isolator Terhadap Respon Struktur Gedung Dengan Ketidakberaturan Massa*. Skripsi. Fakultas Teknik Universitas Negeri Medan, 2025

Ketidakberaturan massa pada bangunan terjadi ketika distribusi massa antar lantai tidak merata, yang dapat menimbulkan konsentrasi gaya gempa dan meningkatkan risiko kerusakan struktur. Salah satu solusi mitigasi yang efektif adalah penerapan *base isolator*, yang dapat memperpanjang periode alami bangunan, mengurangi gaya inersia, serta meningkatkan kinerja seismik struktur. Penelitian ini menganalisis pengaruh penggunaan *High Damping Rubber Bearing* (HDRB) terhadap respons struktur gedung dengan ketidakberaturan massa.

Studi kasus dilakukan pada gedung hotel 10 lantai dengan ketidakberaturan massa pada lantai 2 setinggi 6 m, sedangkan lantai lainnya setinggi 4 m. Analisis struktur dilakukan dengan perangkat lunak berbasis ETABS menggunakan metode *response spectrum* sesuai SNI 1726:2019. Tujuan penelitian adalah membandingkan respons struktur berupa periode fundamental, gaya geser dasar, dan simpangan antar lantai antara model *fixed base* dan *base isolator*.

Hasil analisis menunjukkan bahwa pemasangan *base isolator* meningkatkan periode fundamental dari 2,015 detik menjadi 3,811 detik atau naik sekitar 47%. Peningkatan periode ini menggeser respons bangunan ke wilayah spektrum gempa dengan percepatan lebih rendah, sehingga gaya geser dasar menurun signifikan, yaitu sekitar 43% pada arah X dan 49% pada arah Y dibandingkan kondisi *fixed base*. Selain itu, simpangan antar lantai juga berkurang rata-rata 81% di arah X dan 84% di arah Y. Penurunan gaya internal ini menguntungkan pada bangunan dengan ketidakberaturan massa karena distribusi lateral menjadi lebih merata, risiko kerusakan menurun, dan potensi optimasi dimensi elemen struktur meningkat. Dengan demikian, penggunaan *base isolator* dapat menjadi strategi desain efektif dan ekonomis untuk meningkatkan keselamatan serta kinerja seismik bangunan.

Kata Kunci: *Base Isolator, High Damping Rubber Bearing, Ketidakberaturan massa, Respon Struktur*

ABSTRACT

Rahma Syahyu Br Hasibuan: *The Effect of Base Isolator on the Structural Response of Buildings with Mass Irregularity. Undergraduate Thesis. Faculty of Engineering, Unimed, 2025*

Mass irregularity in buildings occurs when the distribution of mass between floors is uneven, which can lead to concentrated seismic forces and increase the risk of structural damage. One effective mitigation strategy is the implementation of a base isolator system, which extends the natural period of the structure, reduces inertial forces, and enhances its seismic performance. This study analyzes the effect of using High Damping Rubber Bearings (HDRB) on the structural response of a building with mass irregularity.

The case study was conducted on a 10-story hotel building with mass irregularity located on the second floor, which has a height of 6 m, while the other floors are 4 m high. Structural analysis was carried out using ETABS software, applying the response spectrum method in accordance with SNI 1726:2019. The main objective of this study is to compare the structural responses, namely the fundamental period, base shear, and inter-story drift, between fixed-base and base-isolated models.

The analysis results show that the installation of base isolators increases the fundamental period from 2.015 seconds to 3.811 seconds, an increase of approximately 47%. This period elongation shifts the building response to a lower acceleration region of the seismic spectrum, resulting in a significant reduction in base shear by about 43% in the X direction and 49% in the Y direction compared to the fixed-base condition. Moreover, inter-story drift is reduced by an average of 81% in the X direction and 84% in the Y direction. This reduction in internal forces benefits buildings with mass irregularities as it leads to more uniform lateral load distribution, lowers the risk of damage, and allows for potential optimization of structural element dimensions. Therefore, the use of base isolators can serve as an effective and economical design strategy to improve building safety and seismic performance.

Keywords: Base Isolator, High Damping Rubber Bearing, Mass Irregularity, Structural Response