

EVALUASI KINERJA BANGUNAN RUMAH SAKIT SANTA MARIA PEMALANG DENGAN NONLINIER *STATIC PUSHOVER ANALYSIS* METODE ATC-40 DAN FEMA 440

Bima Priya Hutama^[1], *Algazt Aryad Masagala*^[2]

Program Studi Teknik Sipil, Fakultas Sains dan Teknologi, Universitas Teknologi
Yogyakarta

e-mail: ^[1] ikkiandroid6@gmail.com, ^[2] algazt.masagala@staff.uty.ac.id

ABSTRAK

Kondisi geologis Indonesia mempunyai potensi gempa yang melingkupi sebagian besar wilayahnya, karena terletak dalam jalur gempa Pasifik dan jalur gempa Asia. Perencanaan bangunan tahan gempa berbasis kekuatan (force based) berdasarkan SNI-03-1726-2012 telah terbukti berhasil mengurangi korban jiwa. Namun tidak berfungsinya gedung dan fasilitas umum karena kerusakan yang terjadi menyebabkan kerugian ekonomi yang cukup besar. Saat ini arah metode perencanaan tahan gempa beralih dari pendekatan kekuatan (force based) menuju pendekatan kinerja (performance based) dimana struktur direncanakan terhadap beberapa tingkat kinerja. Evaluasi Struktur bangunan Rumah Sakit Santa Maria Pemalang menggunakan Nonlinear Static Pushover Analysis memungkinkan untuk bisa memprediksi pola keruntuhan suatu gedung akibat adanya gempa.

Penelitian tugas akhir dilakukan dengan mengevaluasi kinerja tahanan gempa Gedung Rumah Sakit Santa Maria Pemalang untuk mengetahui level kinerja bangunan (performance level) berdasarkan metode ATC-40 dan FEMA 440. Serta mekanisme terbentuk sendi plastis pada balok kolom dan memprediksi perilaku keruntuhan. Metode penelitian menggunakan respons spektrum dengan program SAP2000v19.

Berdasarkan ATC-40 diperoleh nilai performance point untuk arah $x = 0,00433$ dan arah $y = 0,00408$. Hasil tersebut menunjukkan bahwa struktur gedung yang ditinjau termasuk dalam tingkat kinerja Immediate Occupancy (IO). Sedangkan hasil analisis tingkat kerusakan struktur menggunakan FEMA 440 menghasilkan nilai target perpindahan lateral struktur arah $x = 0,17819$ m, dan arah $y = 0,13524$ m dan termasuk dalam kategori tingkat kinerja struktur Immediate Occupancy (IO). Sebagian besar tingkat sendi plastis balok dan kolom masih dalam Immediate Occupancy (IO). Dalam kategori ini dapat dikatakan kinerja komponen struktur masih dalam keadaan aman saat target perpindahan tercapai.

Kata kunci: non-linier, performance level, pushover, sendi plastis

PERFORMANCE EVALUATION OF SANTA MARIA PEMALANG HOSPITAL BUILDING WITH NONLINIER STATIC PUSHOVER ANALYSIS ATC-40 AND FEMA 440 METHODS

Bima Priya Hutama ^[1], **Algazt Aryad Masagala** ^[2]

Civil Engineering Study Program, Faculty of Science and Technology, University of
Technology Yogyakarta
e-mail: [1] ikkiandroid6@gmail.com, [2] algazt.masagala@staff.uty.ac.id

ABSTRACT

Indonesia's geological conditions have potential earthquakes that cover most of its territory, because they are located in the Pacific earthquake pathway and the Asian earthquake pathway. Force-based earthquake-based building planning based on SNI-03-1726-2012 has been proven to be successful in reducing fatalities. However, the non-functioning of buildings and public facilities because of the damage caused a considerable economic loss. At present the direction of the earthquake resistant planning method switches from a force based approach to a performance based approach where the structure is planned against several levels of performance. Evaluation The structure of the building of Santa Maria Pemalang Hospital using the Nonlinear Static Pushover Analysis makes it possible to predict the collapse pattern of a building due to an earthquake.

The research was carried out by evaluating the performance of the earthquake resistance of Santa Maria Pemalang Hospital to determine the level of performance of the building based on the ATC-40 and FEMA 440 methods. As well as the mechanism formed plastic joints on the column beam and predict collapse behavior. The research method uses spectrum response with the SAP2000v19 program.

Based on ATC-40, the performance point values for the direction $x = 0.00433$ and the direction $y = 0.00408$ are obtained. These results indicate that the building structure reviewed is included in the level of performance of Immediate Occupancy (IO). While the results of structural damage level analysis using FEMA 440 produce the target value of lateral displacement of the direction structure $x = 0.17819$ m, and the direction $y = 0.13524$ m and are included in the category of the level of performance of the Immediate Occupancy (IO) structure. Most levels of plastic beam joints and columns are still in Immediate Occupancy (IO). In this category it can be said that the performance of structural components is still safe when the target of displacement is reached.

Keywords: *non-linear, performance level, pushover, plastic joints*

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