

ABSTRAK

Penelitian ini bertujuan untuk menganalisis dan membandingkan karakteristik spektrum respons gempa yang dihasilkan oleh metode SRSS, Geomean, dan RotD100 berdasarkan evaluasi grafik dan nilai error relatif. Analisis dilakukan pada tiga kondisi tanah, yaitu tanah keras, tanah sedang, dan tanah lunak, dengan menggunakan riwayat waktu gempa yang dipilih berdasarkan peta deagregasi periode ulang 2500 tahun sesuai ketentuan SNI 8899:2020. Proses penskalaan riwayat waktu gempa dilakukan menggunakan dua pendekatan, yaitu penskalaan dua tahap dan penskalaan tiga tahap. Evaluasi kesesuaian spektrum respons terhadap respons spektrum target dilakukan melalui grafik spektrum, grafik rasio, serta perhitungan nilai error relatif melalui parameter *Root Mean Square Error* (RMSE) dan *Mean Absolute Error* (MAE). Hasil penelitian menunjukkan bahwa metode RotD100 secara umum menghasilkan spektrum respons yang paling representatif terhadap respons spektrum target, terutama pada penskalaan tiga tahap untuk seluruh jenis tanah. Hasil penelitian telah memenuhi syarat ketentuan SNI 1726:2019, yaitu rata-rata spektrum respons paling minimum mencapai 90% terhadap respons spektrum target pada seluruh rentang periode yang telah ditentukan. Selain itu, penskalaan tiga tahap terbukti mampu menurunkan nilai error relatif dan menghasilkan kesesuaian spektrum yang lebih baik dibandingkan penskalaan dua tahap.

Kata kunci: respons spektrum, SRSS, Geomean, RotD100, *time history*, penskalaan riwayat waktu gempa, jenis tanah, RMSE, MAE.

ABSTRACT

This study aims to analyze and compare the characteristics of the earthquake response spectrum generated by the SRSS, Geomean, and RotD100 methods based on graphical evaluation and relative error values. The analysis was conducted on three soil conditions, namely hard soil, medium soil, and soft soil, using earthquake time histories selected based on a 2500-year return period deaggregation map in accordance with the provisions of SNI 8899:2020. The process of scaling the earthquake time history was carried out using two approaches, namely two-stage scaling and three-stage scaling. Evaluation of the suitability of the response spectrum to the target spectrum response was carried out through spectrum graphs, ratio graphs, and calculation of relative error values through the Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) parameters. The results showed that the RotD100 method generally produced the most representative response spectrum to the target spectrum response, especially in three-stage scaling for all soil types. The research results meet the requirements of SNI 1726:2019, which requires an average response spectrum of at least 90% of the target response spectrum across the entire specified period. Furthermore, three-stage scaling has been shown to reduce relative error and yield better spectral fit compared to two-stage scaling.

Keywords: response spectrum, SRSS, Geomean, RotD100, time history, earthquake time history scaling, soil type, RMSE, MAE.