ABSTRAK

Negara Indonesia terletak di wilayah Ring of Fire, akibatnya rentan terjadi gempa bumi. Karena itu perlu langkah–langkah antisipasi potensi bahaya, seperti pengembangan sistem struktur yang dapat meredam gaya akibat gempa, namun pada praktiknya pengembangan struktur tahan gempa memerlukan waktu dan biaya yang besar. Teori model Phi Teorm merupakan pemodelan struktur tahan gempa yang dapat dilakukan dengan skala lebih kecil sehingga pengembangan dapat dilakukan lebih murah, mudah dan efisien. Dimulai dari perencanaan gedung prototype dengan total 3 lantai dengan software SAP 2000 menghasilkan frekuensi alami gedung prototype sebesar 1,214 Hz, kemudian dikonversi dengan skala 1 : 15 dengan frekuensi alami gedung prototype dikali dengan √15 didapat skala frekuensi sebesar 4,701 Hz. Pada gedung model yang dirancang dengan skala 1:15 didapat frekuensi alami gedung model sebesar 4,08 Hz. Hasil validasi antara frekuensi alami gedung prototype dengan gedung model pada aplikasi telah dinyatakan valid karena skala frekuensi alami gedung prototype memiliki selisih yang cukup kecil dengan gedung model.

Kata Kunci: Struktur Baja, Buckingham Phi Theorm, Pemodelan Laboratorium.

ABSTRACT

Indonesia is located in the Ring of Fire region, making it susceptible to earthquakes. Consequently, precautionary measures are necessary to anticipate potential hazards, such as the development of structural systems capable of dampening the forces resulting from earthquakes. However, in practice, the development of earthquake-resistant structures requires significant time and cost. The Phi Theory model is a seismic-resistant structural modeling theory that can be implemented on a smaller scale, allowing for more cost-effective, straightforward, and efficient development. Starting with the planning of a prototype building with a total of 3 floors using SAP 2000 software, the natural frequency of the prototype building is determined to be 1.214 Hz. Subsequently, when scaled down to a 1:15 ratio, the natural frequency of the prototype building, multiplied by the square root of 15, yields a scaled frequency of 4.701 Hz. The building model designed at a 1:15 scale has a natural frequency of 4.08 Hz. Validation results between the natural frequency of the prototype building and the model building in the application have been declared valid because the scaled natural frequency of the prototype building has a sufficiently small difference from the model building..

Keywords: Steel Structures, Buckingham Phi Theorm, Laboratory Modeling.