ANALISIS GETARAN BEBAS *SINGLE DEGREE OF FREEDOM* PADA *VERTICAL BENDING BAR*

RM Athlon Fajar Nusantara

ABSTRAK

Penelitian ini bertujuan untuk menganalisis getaran bebas pada sistem *Single Degree of Freedom* (SDOF) menggunakan batang lentur vertikal dengan variasi panjang dan beban tambahan. Eksperimen dilakukan untuk memahami karakteristik dinamis sistem, seperti frekuensi natural dan rasio redaman, tanpa melibatkan analisis teoritis. Batang lentur diuji dengan panjang 70 cm dan 80 cm, serta variasi beban tambahan sebesar 0 gram, 30 gram, dan 60 gram. Data diperoleh menggunakan sensor akselerasi yang dipasang di ujung batang. Hasil penelitian menunjukkan bahwa panjang batang dan beban tambahan memengaruhi karakteristik getaran secara signifikan. Semakin panjang batang atau semakin besar beban tambahan, frekuensi natural menurun, sementara amplitudo dan rasio redaman cenderung meningkat. Pendekatan eksperimental ini memberikan wawasan mendalam tentang perilaku dinamis batang lentur dan dapat menjadi dasar untuk pengembangan metode desain dan analisis struktur fleksibel.

Kata kunci: getaran bebas, batang lentur, frekuensi natural, amplitudo, SDOF

FREE VIBRATION ANALYSIS OF A SINGLE DEGREE OF FREEDOM SYSTEM ON VERTICAL BENDING BAR

RM Athlon Fajar Nusantara

ABSTRACT

This study aims to analyze the free vibration of a Single Degree of Freedom (SDOF) system using vertical bending bars with variations in length and additional load. Experiments were conducted to understand the system's dynamic characteristics, such as natural frequency and damping ratio, without involving theoretical analysis. The flexible bars were tested with lengths of 70 cm and 80 cm, and additional loads of 0 grams, 30 grams, and 60 grams. Data were collected using an acceleration sensor mounted at the bar's tip. The results reveal that bar length and additional load significantly affect vibration characteristics. Longer bars or bars with larger loads exhibit lower natural frequencies, while amplitudes and damping ratios tend to increase. This experimental approach provides a profound understanding of the dynamic behavior of flexible bars and serves as a foundation for developing design and analysis methods for flexible structures.

Keywords: *free vibration, flexible bar, natural frequency, amplitude, SDOF*