ABSTRAK

PENGUKURAN FREKUENSI RESONANSI RESONATOR HELMHOLTZ MENGGUNAKAN SENSOR BUNYI BERBANTUAN LOGGER PRO

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Penelitian ini bertujuan untuk menentukan frekuensi resonansi pada resonator Helmholtz yang dipengaruhi oleh panjang leher dan volume rongga resonator menggunakan sensor bunyi berbantuan *software Logger Pro* dengan sumber bunyi berupa sinyal *frequency sweep*. Pengaruh perubahan volume rongga udara dan panjang leher dianalisis terhadap hasil frekuensi resonansi yang dihasilkan. Penelitian dilakukan menggunakan resonator berbahan dasar akrilik dengan leher resonator berupa pipa PVC. Sumber bunyi *frequency sweep* dibangkitkan melalui aplikasi Audacity dan dipancarkan melalui *speaker*, kemudian respons bunyi yang dihasilkan resonator dideteksi oleh sensor bunyi dan direkam dalam bentuk grafik hubungan tekanan suara terhadap waktu menggunakan *software Logger Pro*. Frekuensi resonansi ditentukan berdasarkan waktu kemunculan titik tekanan suara maksimum pada grafik. Hasil penelitian menunjukkan bahwa frekuensi resonansi berbanding terbalik dengan volume rongga udara, di mana pada rentang 292 mL sampai 412 mL, frekuensi resonansi menurun dari 252,5 Hz hingga 213,8 Hz, dengan koefisien korelasi hubungan linear sbeesar 0,9942. Frekuensi resonansi juga berbanding terbalik dengan panjang leher efektif resonator, di mana pada rentang panjang leher 16,85 cm sampai 26,69 cm, frekuensi resonansi rata-rata menurun dari 255,7 Hz hingga 229,6 Hz, dengan koefisien korelasi sebesar 0,9883. Kedua hasil tersebut menunjukkan kesesuaian yang baik dengan persamaan teoritis resonator Helmholtz. Metode *frequency sweep* berbantuan sensor bunyi dan *Logger pro* efektif dalam menentukan frekuensi resonansi secara langsung dan dapat dikembangkan menjadi media pembelajaran resonansi bunyi.

Kata kunci: Resonator Helmholtz, Frekuensi resonansi, Volume rongga udara, Panjang leher, dan *Frequency sweep***.**

ABSTRACT

HELMHOLTZ RESONANCE FREQUENCY MEASUREMENT USING LOGGER PRO-ASSISTED SOUND SENSOR

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This study aims to determine the resonance frequency of the Helmholtz resonator which is influenced by the neck length and the volume of the resonator cavity using a sound sensor assisted by Logger Pro software with a sound source in the form of a frequency sweep signal. The effect of changes in the volume of the air cavity and the length of the neck is analyzed on the resulting resonance frequency results. The study was conducted using an acrylic-based resonator with a resonator neck in the form of a PVC pipe. The frequency sweep sound source was generated through the Audacity application and transmitted through a speaker, then the sound response produced by the resonator was detected by the sound sensor and recorded in the form of a graph of the relationship between sound pressure and time using Logger Pro software. The resonance frequency was determined based on the time of appearance of the maximum sound pressure point on the graph. The results of the study showed that the resonance frequency was inversely proportional to the volume of the air cavity, where in the range of 292 mL to 412 mL, the resonance frequency decreased from 252,5 Hz to 213,8 Hz, with a linear correlation coefficient of 0,9942. The resonance frequency is also inversely proportional to the effective neck length of the resonator, where in the range of neck lengths from 16,85 cm to 26,69 cm, the average resonance frequency decreases from 255,7 Hz to 229,6 Hz, with a correlation coefficient of 0,9884. Both results show good agreement with the theoretical equation of the Helmholtz resonator. The frequency sweep method assisted by sound sensors and Logger pro is effective in determining the resonance frequency directly and can be developed into a learning medium for sound resonance.

***Keywords**: Helmholtz Resonator, Resonance Frequency, Air Cavity Volume, Neck Length, and Frequency Sweep.*