Title
LASER OPTOACOUSTIC SPECTROSCOPE PROJECT. ROUGH CALIBRATION OF PHASE I HELMHOLTZ COIL SYSTEMS

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Author
Nelson, D.H.

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The "Helmholtz" coil design for the coil pair tested is described in MT 314. This note presents the preliminary tests and calibrations completed by Magnetic Measurements Engineering before we loaned the equipment to Shu-Shia Chen.

Figure 1 shows the hardware loaned to Shu-Hsia Chen for studies related to the Laser Optoacoustic Spectrometer Project. Table I lists specific equipment and some significant parameters.

After adjusting the Gaussmeter's zero and calibration controls, we collected the data summarized in Table II.

On March 17th, Dr. Shu-Hsia Chen reported successful operation of the hardware provided. She does not plan to operate at higher (than ~250 Gauss) fields as the coil temperature masks the effect of magnetic field.

Distribution

N. Amer
S.H. Chen
C.G. Dols
M.I. Green
E.C. Hartwig/L.J. Wagner/F.S. Goss
J. Katz

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Laser Optoacoustic Spectrometer Project
Rough Calibration of Phase I Helmholtz Coil System

NAME: D.H. Nelson
DATE: March 19, 1982

Figure 1  Circuit for Energizing Helmholtz Coil
and for Measuring Resultant Field
Helmholtz Pair

Coil Form

MT 314, Figure 1

Coils (2 each)

350 Turns AWG No. 24 Heavy Formvar
Mean Radius, \( a = 0.016 \) m
Room Temperature Resistance \( \approx 7.0 \pm 0.3 \Omega \)

Locator Holes

4 - 3/16" D Holes (See MT 314, Figure 1)

Resistors (Current Limiting) None Required for Phase I

Ammeter

Keithley Mod 172A
S/N 14098

Power Supply

Lambda Mod LP520FM
(5 A/10 V)
S/NB14168

Gaussmeter

F.W. Bell Mod 620
AEC No. 501586

Probe Mod HTJ4-0608
S/N 150289

Shield Mod YA111
No S/N

TABLE I Equipment List

<p>| Helmholtz Coil-Pair Magnetic Normalized          |</p>
<table>
<thead>
<tr>
<th>Series Current</th>
<th>Induction</th>
<th>Magnetic</th>
<th>Induction</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_0 ) (A)</td>
<td>( E_{load} ) (V)</td>
<td>( B_z(z = 0) ) (G)</td>
<td>( B_z/I_0 ) (G/A)</td>
</tr>
<tr>
<td>+1.0</td>
<td>6.8 ±0.1</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>+1.5</td>
<td>&gt;10</td>
<td>260</td>
<td>173</td>
</tr>
<tr>
<td>-1.0</td>
<td>7.1</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>-1.47</td>
<td>&gt;10</td>
<td>256</td>
<td>174</td>
</tr>
</tbody>
</table>

(Measured Values \( \sim 14\% \) Low @ 1.5 A)

Design Estimate 1.53 300 196

TABLE II Rough Calibration of Helmholtz Coil Pair
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