OceanGen Motor Parameters Derived from Initial Lab Tests

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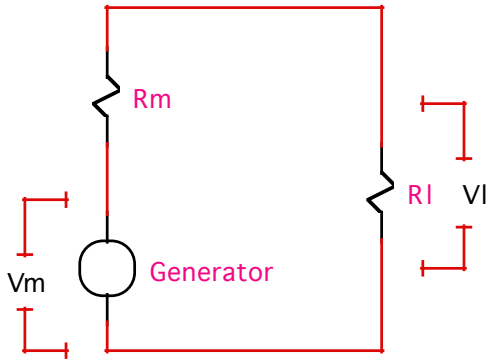
We have a generator that produces an unknown voltage Vm and contains an unknown resistance Rm. Connected to this is a known load resistance Rl with a measured load voltage Vl. The actual generator is three-phase AC feeding a rectifier, but we can represent it as a single-phase DC generator.



Levant Power made some measurements on their test rig:
At 8 cm/s, we have 25 v across 50 ohms and 22 v across 10 ohms
At 20 cm/s, we have 65 v across 50 ohms and 55 v across 10 ohms
We know that Vm = Vl(Rm+Rl)/Rl
Solve for Vm and Rm at each speed

```
In[1]:= eqn1 = Vm == 25 (Rm + 50) / 50
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$$\text{Out[1]= } Vm == \frac{50 + Rm}{2}$$

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In[2]:= eqn2 = Vm == 22 (Rm + 10) / 10
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$$\text{Out[2]= } Vm == \frac{11\ (10 + Rm)}{5}$$

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In[8]:= sol1 = Solve[{eqn1, eqn2}, {Vm, Rm}] // N
Out[8]= {{Vm → 25.8824, Rm → 1.76471}}

In[5]:= eqn3 = Vm == 65 (Rm + 50) / 50
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$$\text{Out[5]= } Vm == \frac{13\ (50 + Rm)}{10}$$

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In[6]:= eqn4 = Vm == 55 (Rm + 10) / 10
```

$$\text{Out[6]= } Vm == \frac{11\ (10 + Rm)}{2}$$

```
In[9]:= sol2 = Solve[{eqn3, eqn4}, {Vm, Rm}] // N
Out[9]= {{Vm → 68.0952, Rm → 2.38095}}
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The two motor resistance values vary quite a bit, but these lab measurements are probably pretty rough. Rm includes the clip leads used for lab testing and losses in the rectifier.

Now find the motor voltage constant in volts/(meter/ second) at each speed. It shouldn't change much.

```
In[11]:= Vm / 0.08 /. sol1
Out[11]= {323.529}

In[12]:= Vm / 0.20 /. sol2
Out[12]= {340.476}
```

From this we can see that at 2 meter/second we would produce at least 650 volts, and the motor resistance would drop this about 2 volts for every amp of current we draw.