Goal
The aim of this project is to convert linear motion of a 'point absorber' wave energy converter (Figure 1) into electricity using an optimized linear generator

Scope of Work
Work for this project includes composing analytical design tools for sizing purposes which will be compared to a finite element model.

The tubular, longitudinal flux, and transverse flux linear generator models described in Table 1 will be incorporated into an optimization routine to find a machine that satisfies the following criteria:

1) Increasing shear stress capabilities while minimizing cost and size,
2) Reducing stress on the bearings of large linear generators by decreasing cogging,
3) Reducing stress on the bearings of large linear generators by decreasing cogging,
4) Reducing stress on the bearings of large linear generators by decreasing cogging,

The placement of varying numbers of the optimized machine will then be modeled in one 'point absorber' device for improved performance and cost-reduced designs.

References

Linear Machine

<table>
<thead>
<tr>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transverse Flux (Figure 2)</td>
<td>• Flux runs through the iron u-cores, situated radially</td>
<td>• The shear stress density of conventional machines range between 20-40 kN/m², but the TFPM produces significantly more [1]</td>
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<tr>
<td>Tubular (Figure 3)</td>
<td>• May use radial, axial or Halbach aligned PMs in the translator.</td>
<td>• These machines have a higher force-to-weight ratio than the flat linear topology [5]</td>
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<td>Longitudinal Flux (Figure 4)</td>
<td>• The stator may have two, four, six, or eight (Figure 4) sides which mimic the circular structure of the tubular generator.</td>
<td>• An airgap winding (no iron in the translator) may be used to eliminate magnetic attraction between stator and translator at the expense of low shear stress and cost efficiency</td>
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Special Considerations
Cascading effects of slow translator velocity:
⇒ Need for large number of winding turns (and poles) to obtain acceptable induced voltage as dictated by Faraday’s Law of induction
⇒ Large machine inductance
⇒ Low power factor, machine regulation difficulty, and increased cogging/reductance torque