



Shore Protection and Potable-Water Production
Using a
Wave-Energy Conversion Technique

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Discussion Topics

- Exploitation of Wave Energy
- Diffraction Wave Focusing
- Shore Protection by Antenna Buoys
- Potable Water Production
- Conclusion

Exploitation of Wave Energy

Wave-Energy Conversion Schemes

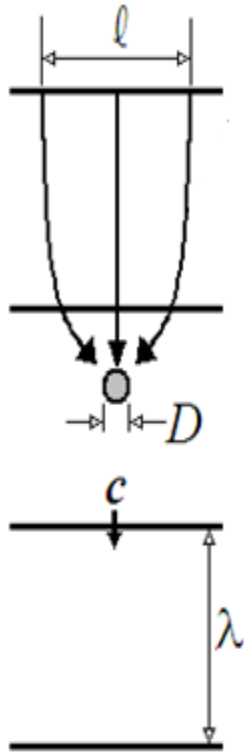
Wave Energy -> Device -> Power-Take-Off ->

1. Electricity -> **Product or Service**

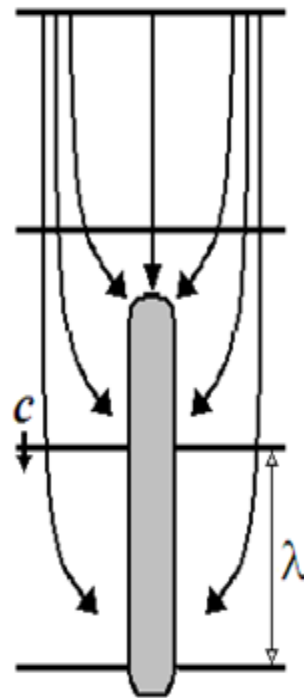
2. **Product or Service**

Exploitation of Wave Energy

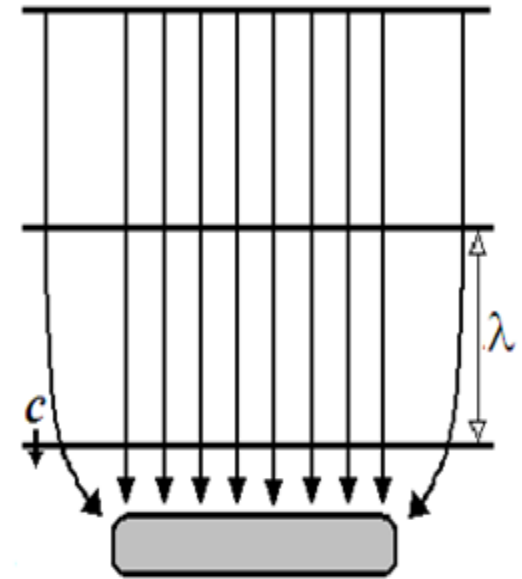
Wave-Energy Conversion Methods & Diffraction Focusing



a. Point-Absorber



b. Attenuator



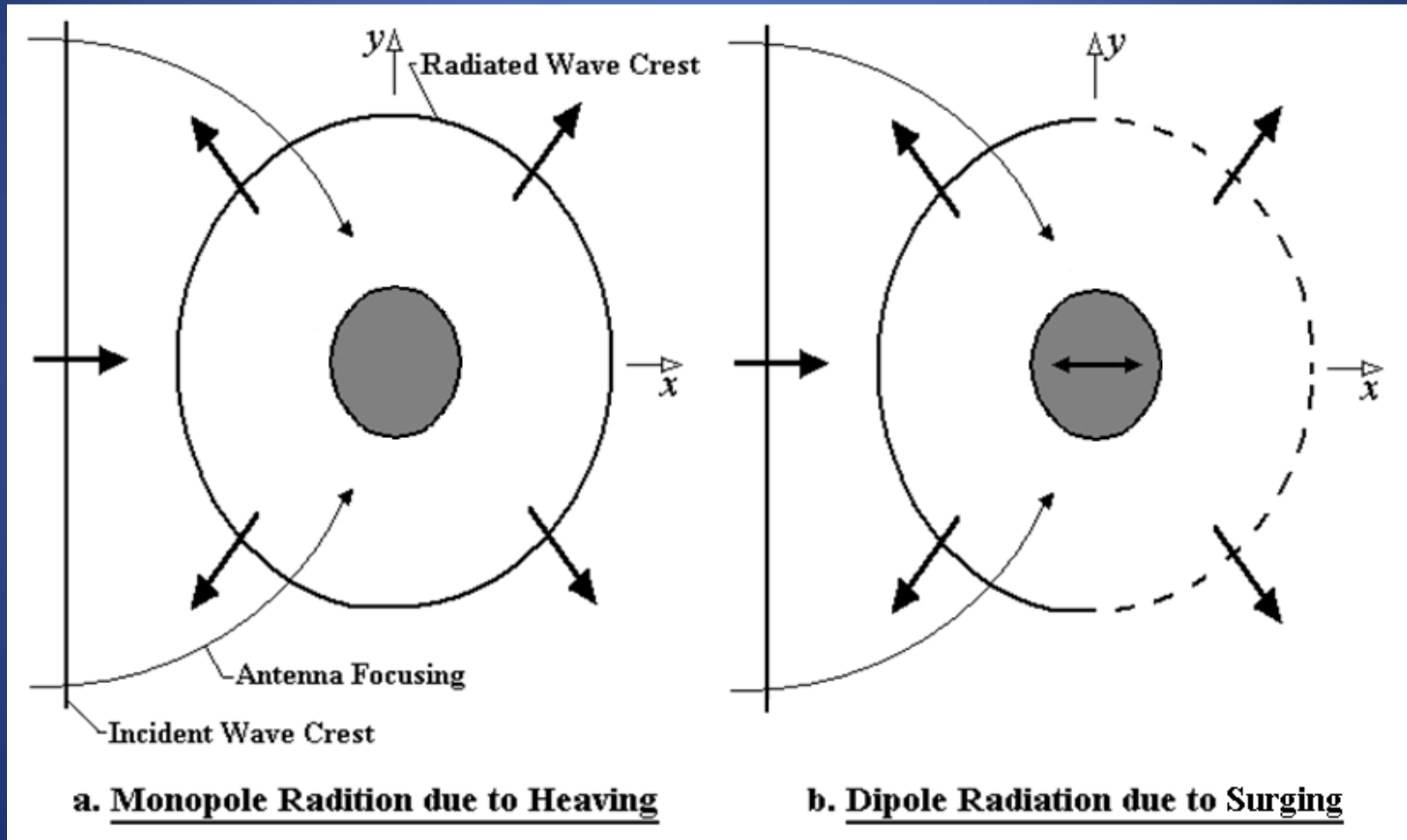
c. Terminator

Diffraction Wave Focusing

- Incident Wave Energy ->
- Wave-Induced Motions ->
- Radiation ->
- Destructive Interference ->
- Diffraction (Wave-Energy Transfer Along the Incident Wave Crests)

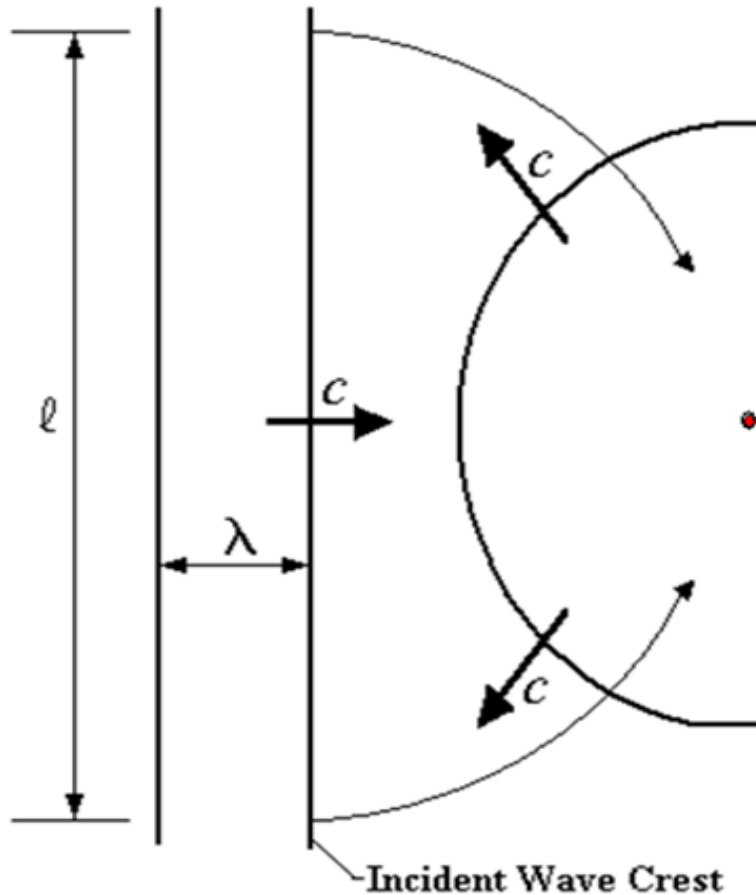
Diffraction Wave Focusing

Wave Focusing on a Point Absorbers



Diffraction Wave Focusing

Capture Width vs. Operational Mode



Maximum Capture Widths (ℓ)

- a. Heave ————— $\lambda/2\pi$
- b. Pitch & Surge ————— λ/π
- c. Heave & Surge* ————— $3\lambda/2\pi$
- d. Heave, Pitch & Surge — $3\lambda/2\pi$

 *Approximate Motions of the *Antenna Buoy*

Ocean Waves and Oscillating Systems

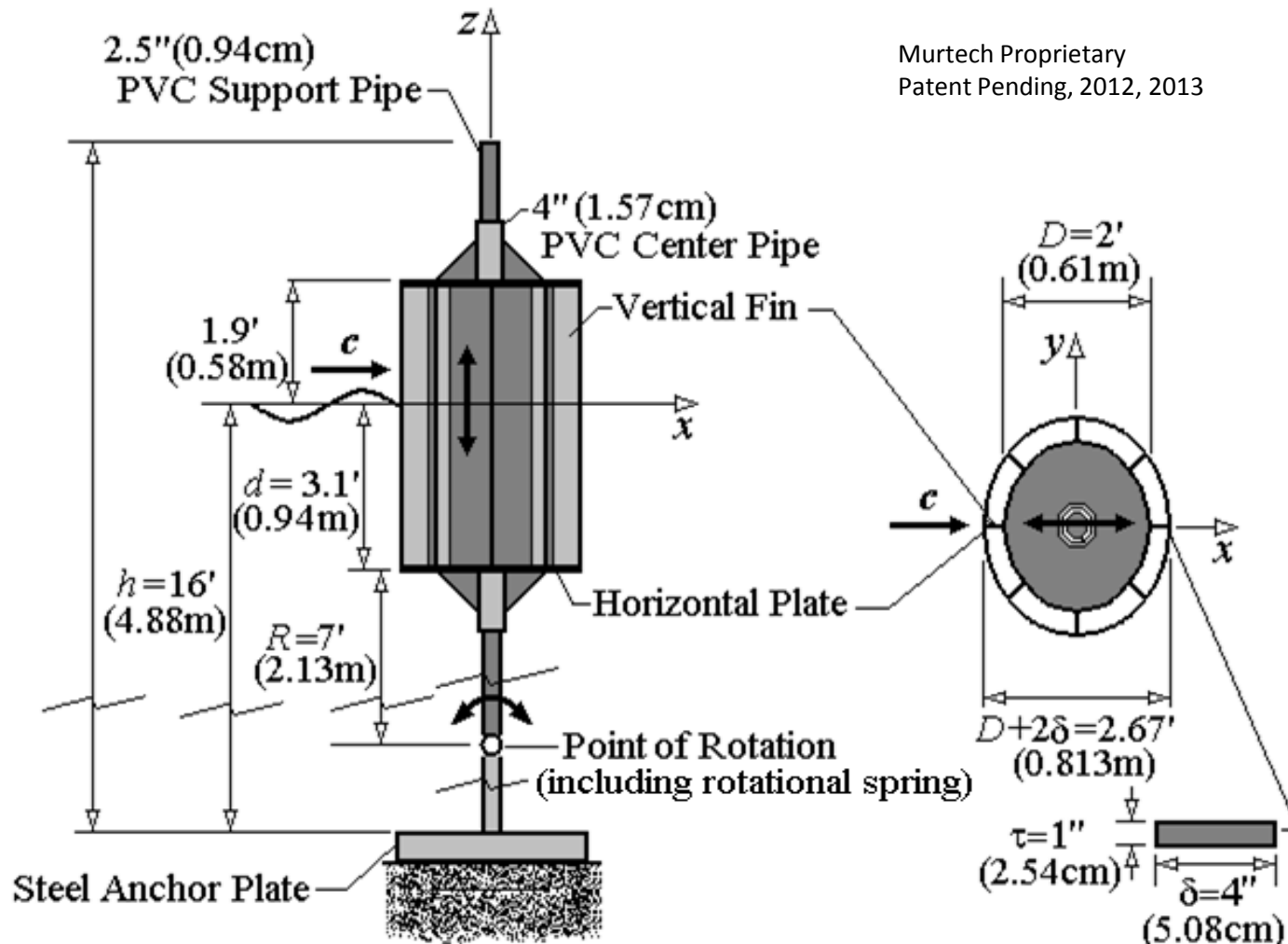
by Johannes Falnes

Cambridge University Press (2002)

Chapter 6

Shore Protection by Antenna Buoys

Full-Scale Test Dimensions



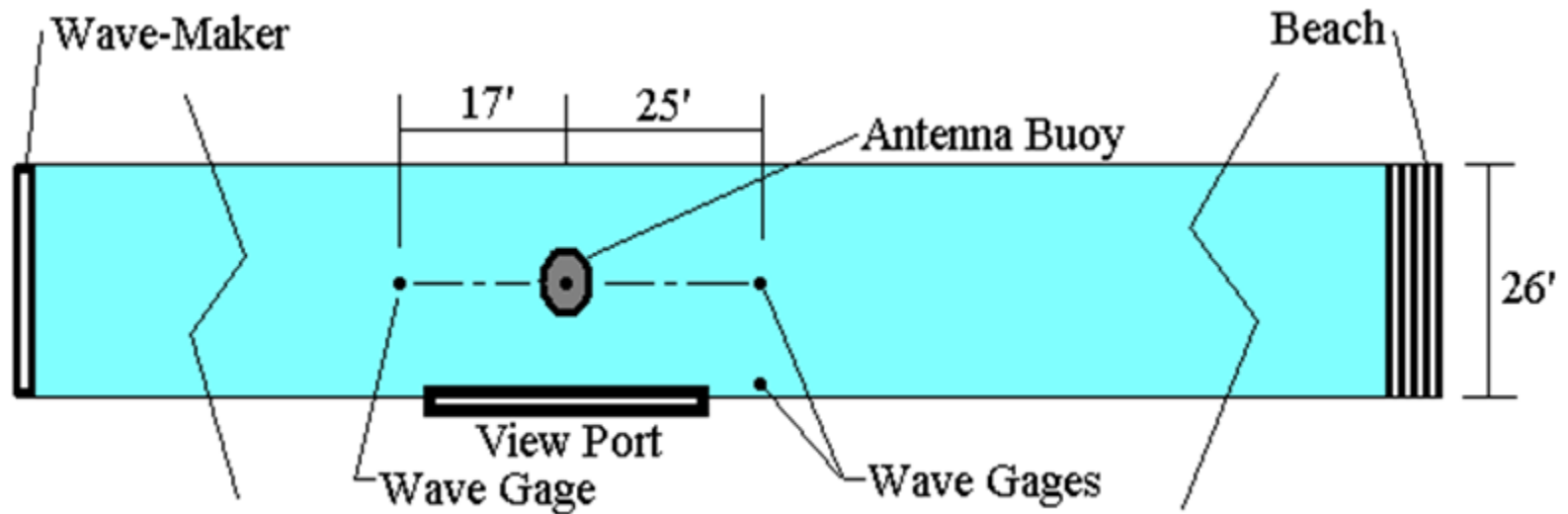
Murtech Proprietary
Patent Pending, 2012, 2013

a. Elevation Sketch

b. Cut-Away Waterplane Sketch

Shore Protection by Antenna Buoys

Full-Scale Wave-Tank Test Orientation



Shore Protection by Antenna Buoys

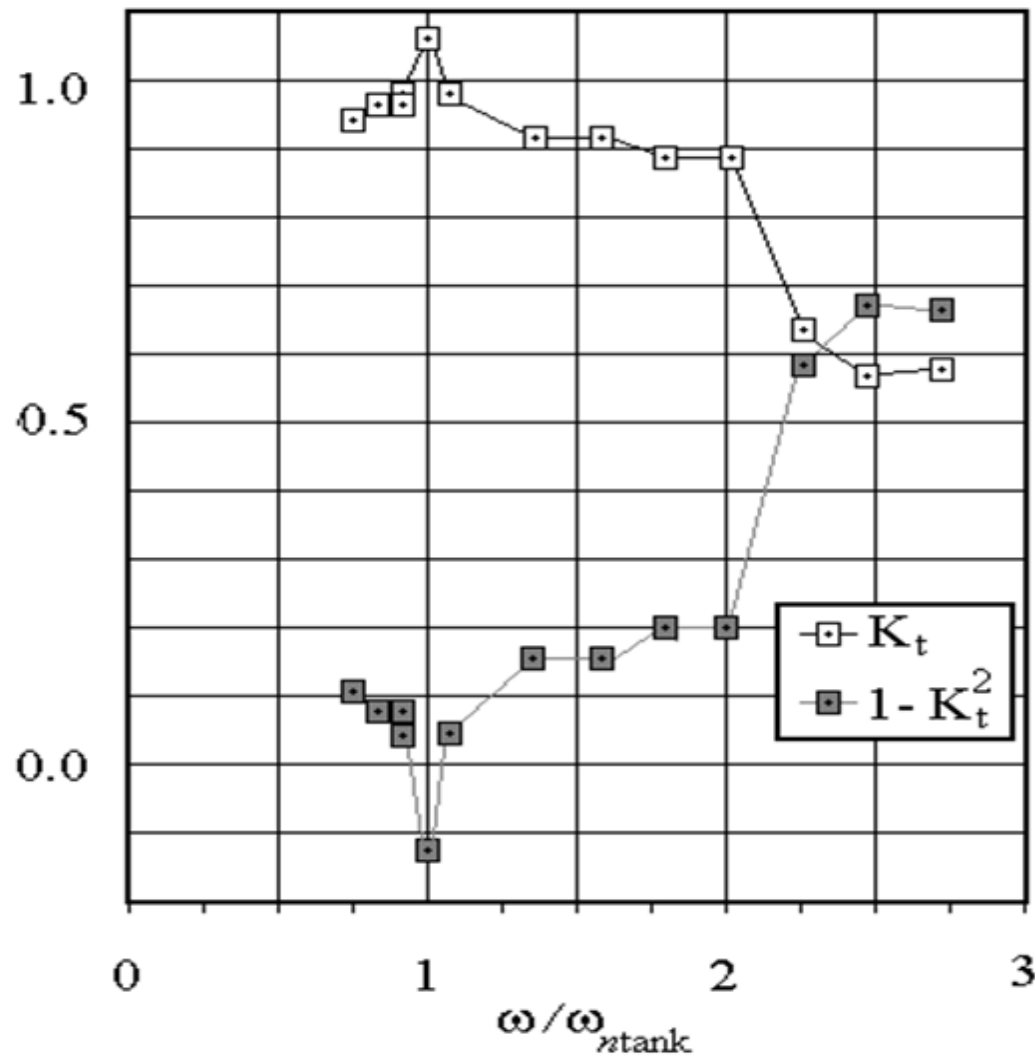
Chesapeake Bay Prototype



Murtech Proprietary
Patent Pending, 2012, 2013

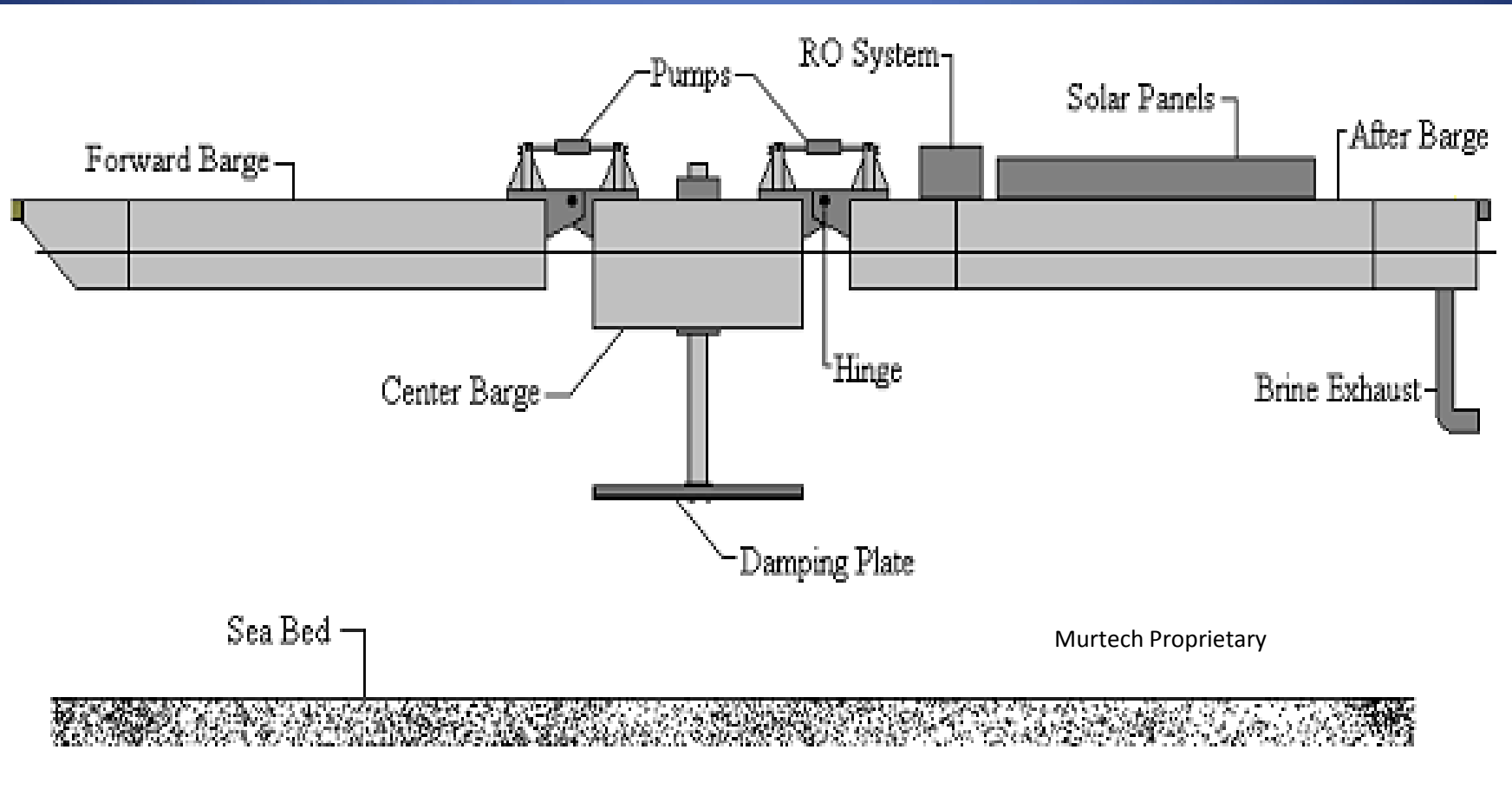
Shore Protection by Antenna Buoys

Full-Scale Test Results



Potable Water Production

Articulate Wave Energy Conversion System (AWECS)



Potable Water Production

Planned AWECS Deployment

- Length: 42 meters
- Breadth: 6.1 meters
- Forward and After Barge Drafts: 1.0 meter
- Center Barge Draft: 2.0 meters
- Design (Average) Wave Height: 1.0 meter
- Design (Average) Wave Period: 6.5 seconds
- Designed Potable Water Production: 10^5 gpd

Conclusions

- Shore protection by Antenna Buoy arrays is a non-permanent method for coastline stabilization and SUV protection.
- Antenna Buoy arrays will produce salients rather than tombolo formations.
- The AWECS provides a “green” method of producing potable water *via* reverse osmosis (RO).
- The AWECS RO method is particularly suited to remote coastal communities.
- The performance optimizations of the Antenna Buoy and the AWECS depend on phase control to assure destructive interference with the incident waves, thereby causing diffraction focusing.