Bibliography

# Bibliography

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# Notes

* (Marine Power Systems, 2019)
  + A website with a video of the wavesub device. A submerged balloon with 4 tethers.
* (Hillis, n.d.)
  + An unreleased paper that details the effect of model errors on a real-time control strategy (see other paper). The control strategy is compared to an “optimally tuned, passively damped” system and found to have superior energy capture. 200% better with perfect future knowledge and 68% better with a dynamic model (Kalman)  
      
    Signicant drift from the ‘nominal position’ is observed and put down to ‘model mismatch’. ~~Andy earlier suggested it was a bit unclear what was doing this. 2DOF -> 6DOF errors?~~ Not the same thing, Stiffness matrix just changes as buoy moves.  
      
    The paper focuses on the effect of model errors on performance
* (Hillis, et al., To Appear)
  + An unreleased paper detailing the development of the active control strategy used to obtain 80% more power than an “optimally tuned, passively damped” system over a range of seas.  
      
    Uses ‘Simple and Effective’ control strategy. Consists of Kalman filter with a Linear Quadratic Regulator (LQR). Wave Excitation force estimated from Velocity reference and system kinematics. Short term prediction via random walk? Seems Gaussian.
* (Nguyen & Tona, 2018)
  + A paper detailing methods to estimate and predict ‘wave excitation force’. Two methods used: linear kalman filter (LKF) method with a random walk prediction; Receding horizon estimation algorithm (with wave excitation force as disturbance input). Uses the Wavestar Point Absorber for practical tests.
* (Salter, 1974)
  + The original paper proposing the harvesting of energy from waves and the first presentation of the Salter Duck design.
* (Evans, 1976)
  + A development on Salter’s paper showing how to predict power absorption efficiency in idealized, 2D scenarios. Helpfully lists similar work developed at the same time.
* (Evans, et al., 1979)
  + An article reporting an experiment where a long submerged cylinder (Source of the Bristol Cylinder?) was able to absorb wave energy with some efficiency. It observes that the linear theory does not apply in practice. The article describes this as a benefit as too much energy may be “an embarrassment”. It further thanks Salter for his facilities in Edinburgh which were made with a grant from the Department of Energy.  
      
    It appears this was the first article in a new journal. Presumably Salter et. Al. created it.
* Ringwood & Frisco is the paper with drift in it (that could be reproduced and investigated)
* (Fusco & Ringwood, 2013)

# The story

1973 Oil Crisis Leads UK government (Department of Energy) to fund alternative energy research.

Salter S. H. proposes Wave power and the Salter Duck in Edingburgh (funded by DoE)

British interest in the Wave Power is picked up by Evans in Bristol, meanwhile the Americans develop similar theories.

…

The Embargo ends in the 1980s and interest in alternative energy wanes. Salter retains funding for a bit but eventually loses his grant money to nuclear research. Bitter feelings about this persist to modern day.

…

Pelamis and oyster: 2 near commercial successes (industrial backers bowed out)

Pelamis: £95 million of funding before project wound down. IP allegedly stolen by the Chinese.

Wave energy Scotland funded 25mil worth of wave energy projects.

Levelised Cost of Energy – determines commercial viability

There’s always waves – power availability near 100% unlike wind and solar.

Who picks it back up? Where is it at today? Who made the leap from 2D to 3D?

Andy hasn’t tried the Ringwood control strategy on an idealized model. Does drift still occur in an idealized model? Might give a clue.

Plan:  
  
Idealised model -> Kinematic model -> Identify problems -> Improvements -> Test (range of sea states) -> Write up

* Phase 1: Reproduce prior work & get to grips with simulation
* Phase 2: Attempt solution
* Re-evaluation point
* Phase 3a: Refine found solution
* Phase 3b: Explore alternatives
* Phase 3c: A bit of both