



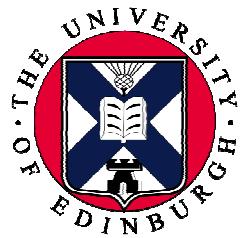
UNIVERSITY OF  
**Southampton**



**ROBERT GORDON  
UNIVERSITY•ABERDEEN**

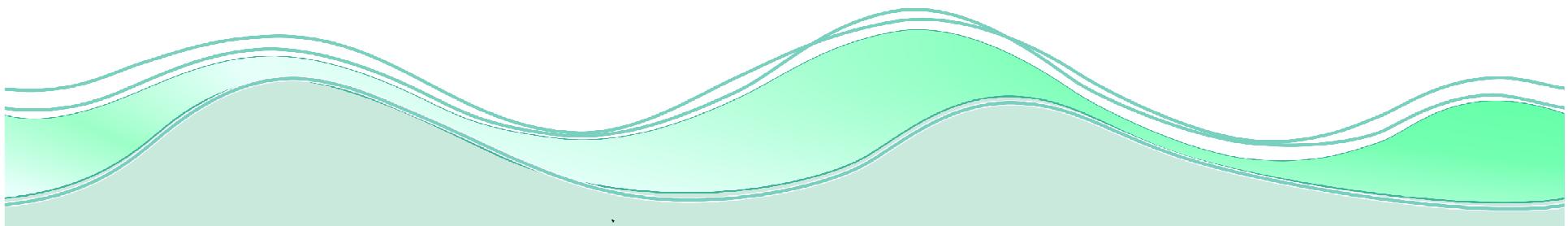


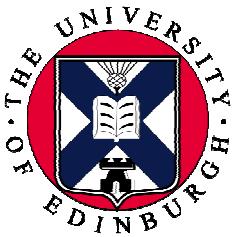
Mathew Topper



# Dr. Mathew Topper: A Geek Odyssey

Mathew Topper

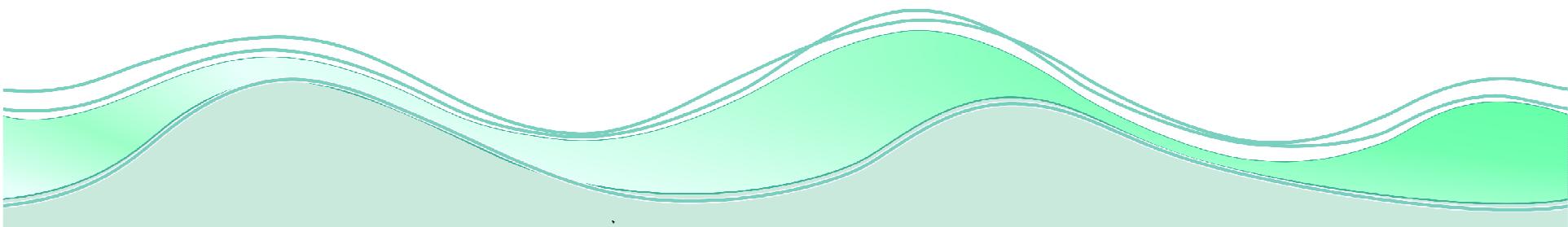


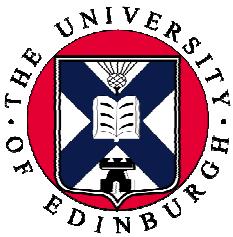


# OVERVIEW



- ‘fifthwave’
  - Python analysis and dispatch for Starccm+.
- ‘edengths’
  - Replacement Latex template for thesis formatting.
- PhD Thesis
  - Numerical Modelling of Flows Involving Submerged Bodies and Free Surfaces.
  - Counter-propagating Solitary Waves
- Collaborative Opportunities
  - Wikis and Mailing Lists.
- Some Other Work...

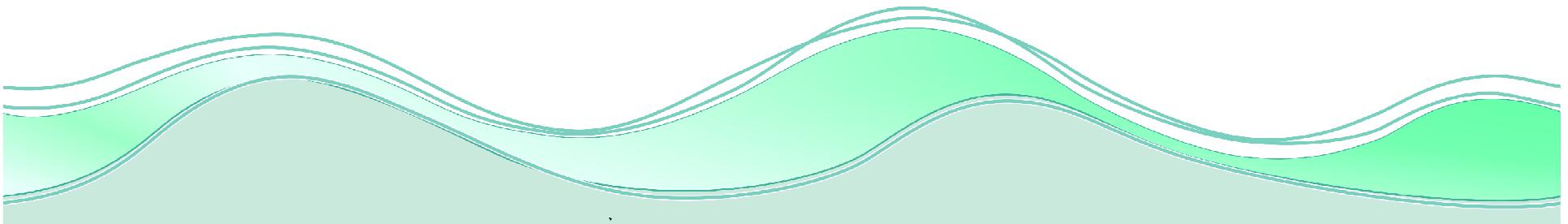


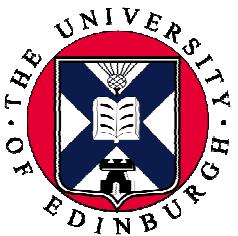


## 'fifthwave'

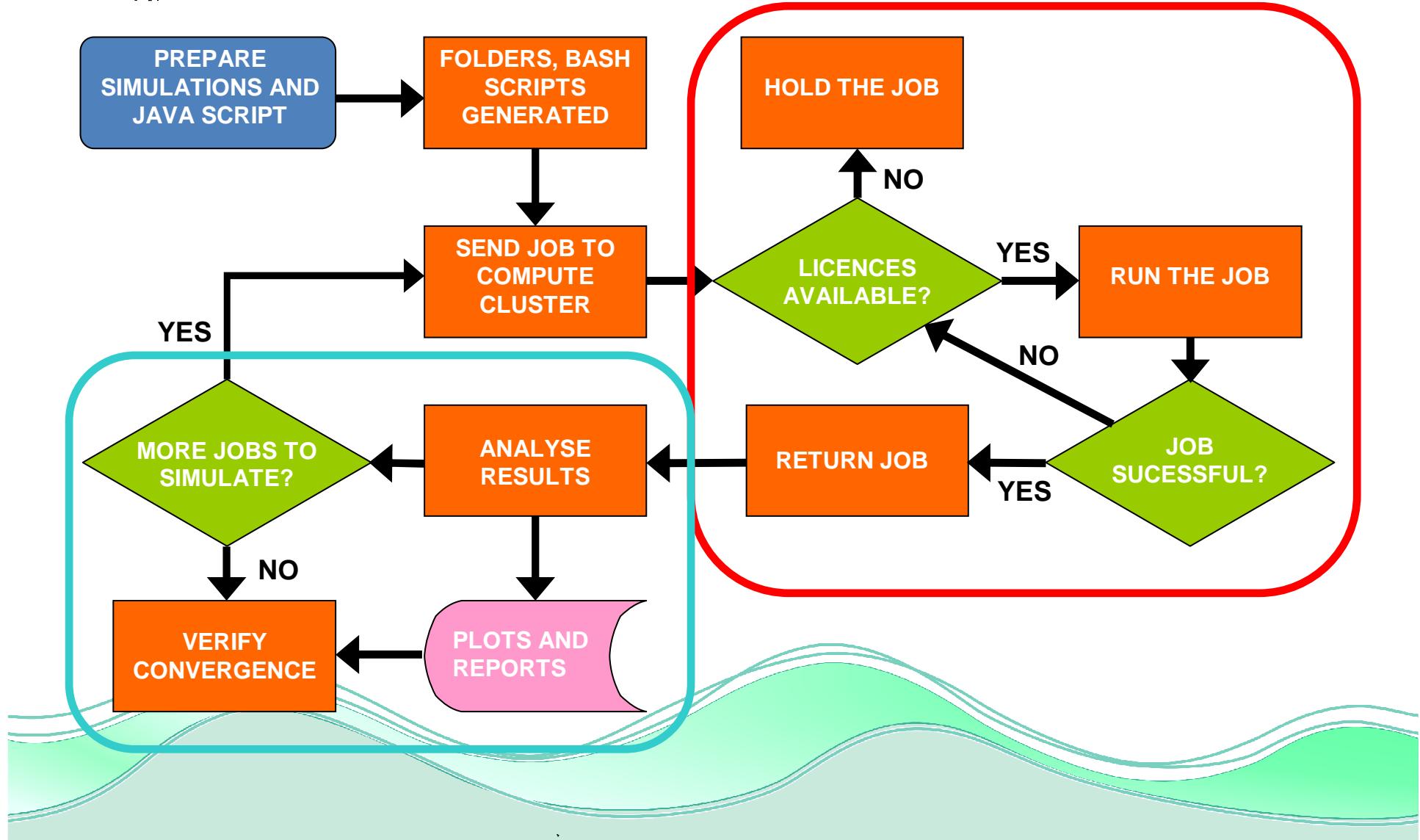


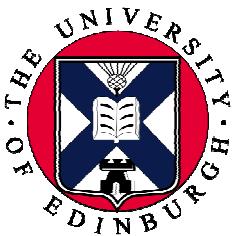
- Investigation into the impact of a cross current on a wave energy converter using Starccm+ CFD package.
- Starccm+ has no metrics to verify the quality of its wave generation.
- 'fifthwave' started as an attempt to produce such metrics for data exported from Starccm+ and evolved into an automated job delivery system.



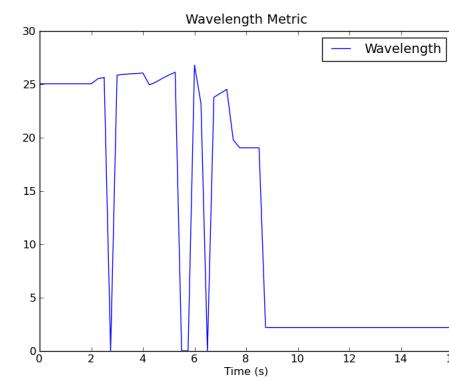
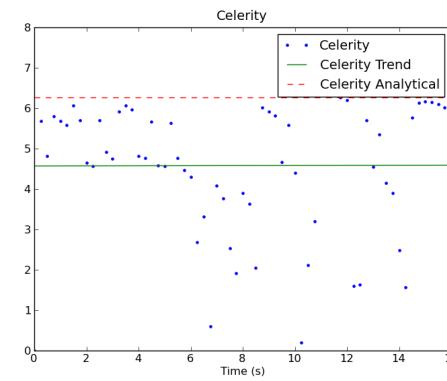
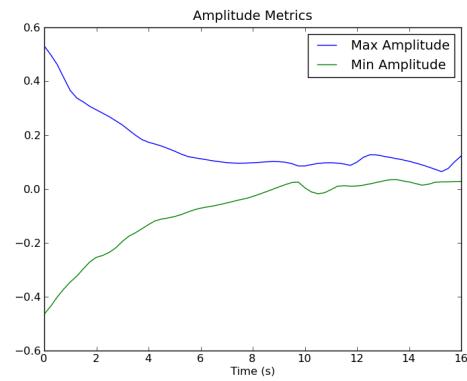


# HOW IT WORKS

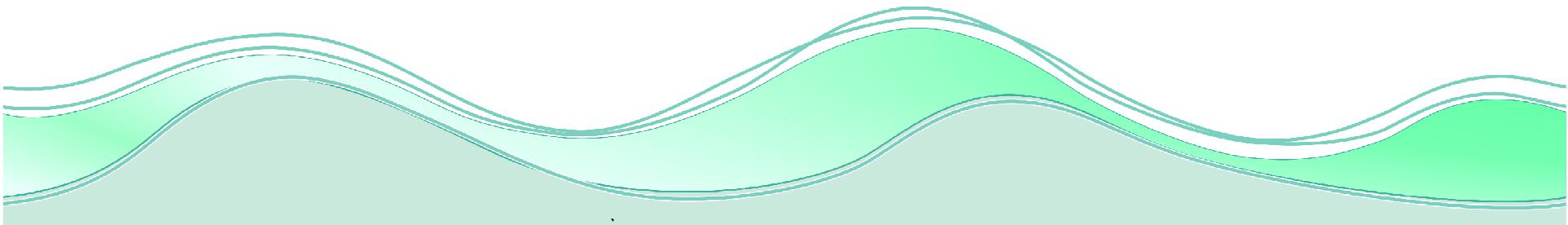


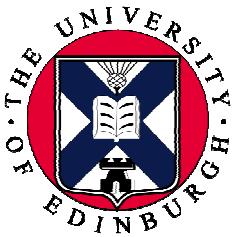


# PROGRESS



- Release 0.2 is **reliable**.
- Releases 0.3 and 0.4 aim to increase accuracy and usability.
- Ditz bug tracker is published here:
  - <http://www.see.ed.ac.uk/~s0575124/fifthwave/>
- Subversion repository is here:
  - <https://svn.see.ed.ac.uk/svn/s0575124/python/fifthwave/>

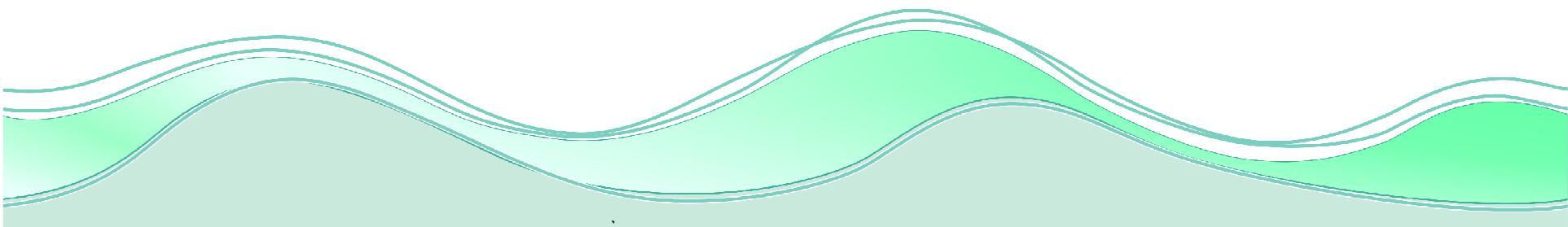


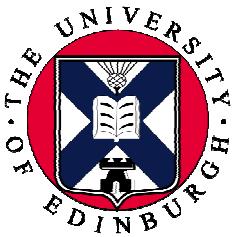


## 'edengths'



- I was asked to re-author the existing latex template due to its unreliability and as the maintainer has left the University.
- New template has more flexibility as I will demonstrate.
- Template can be downloaded by an:
  - svn export <https://svn.see.ed.ac.uk/svn/s0575124/latex/edengths/trunk/> edengths
- I'm prepared to do some "training" to use this template as well as general latex help, if anyone is interested.

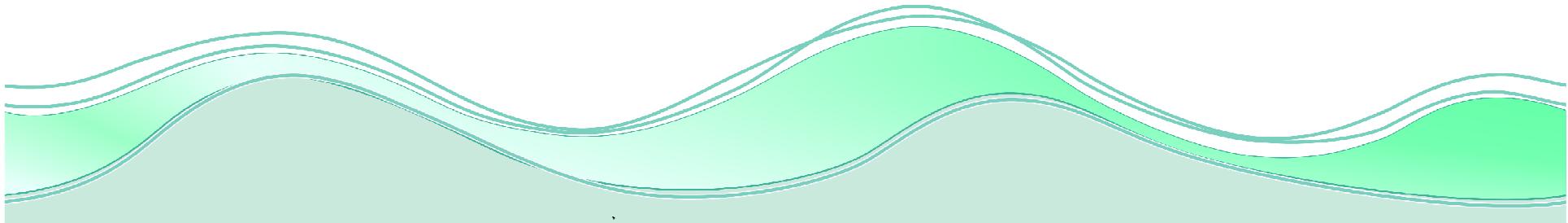


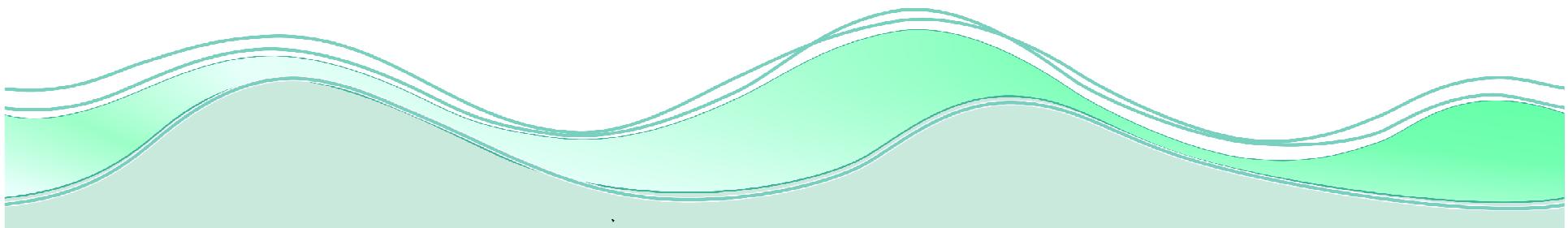
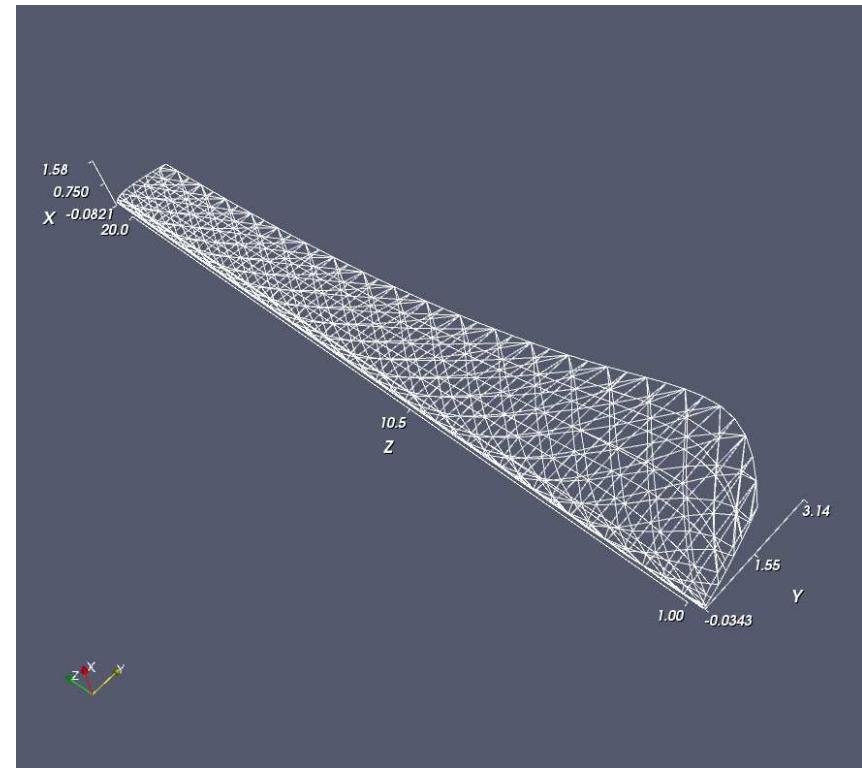
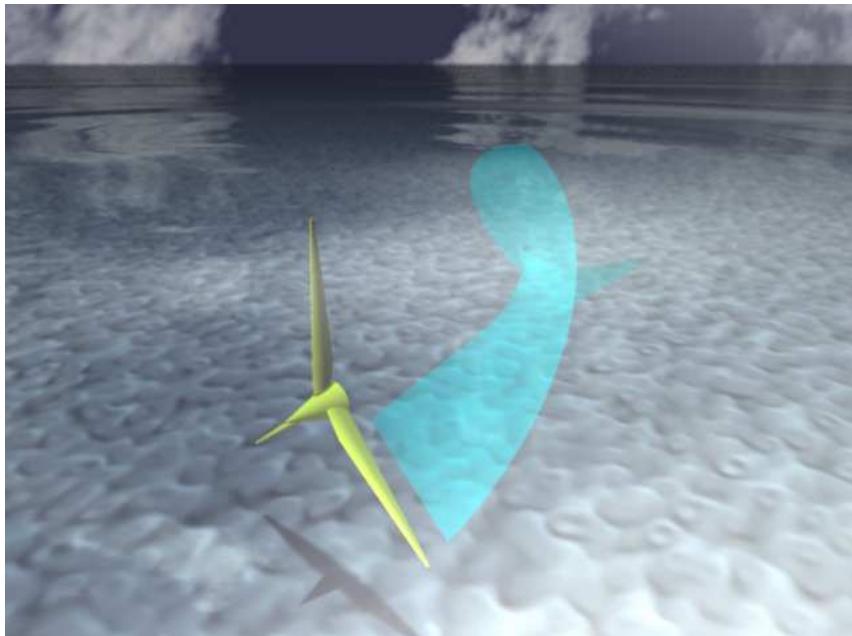
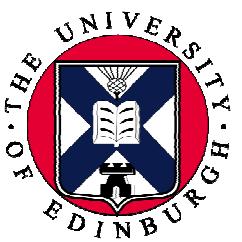


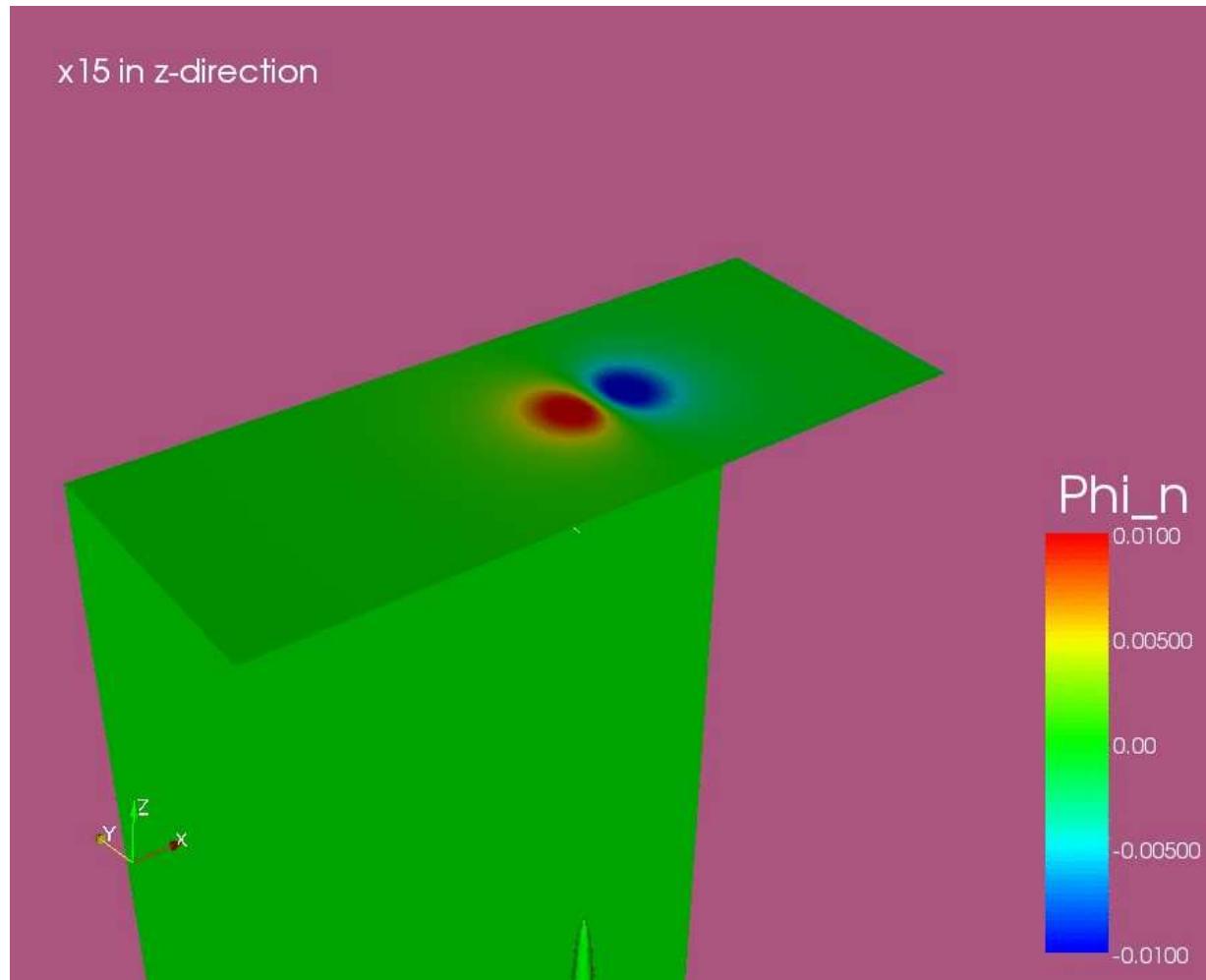
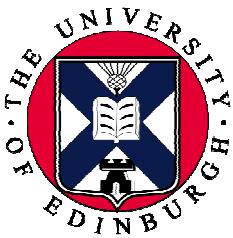
# PhD THESIS

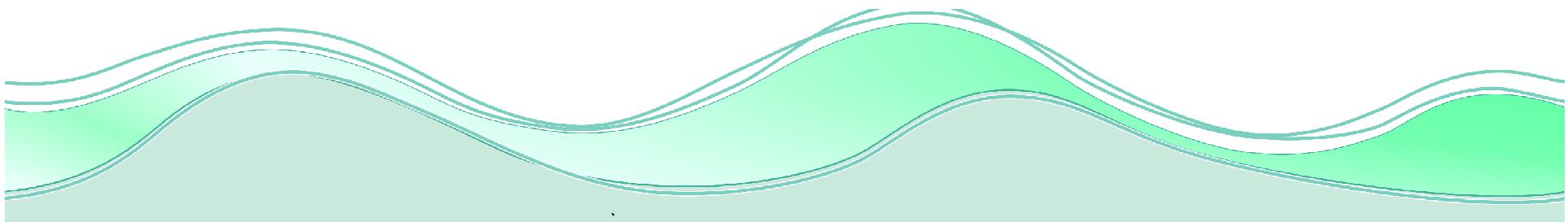
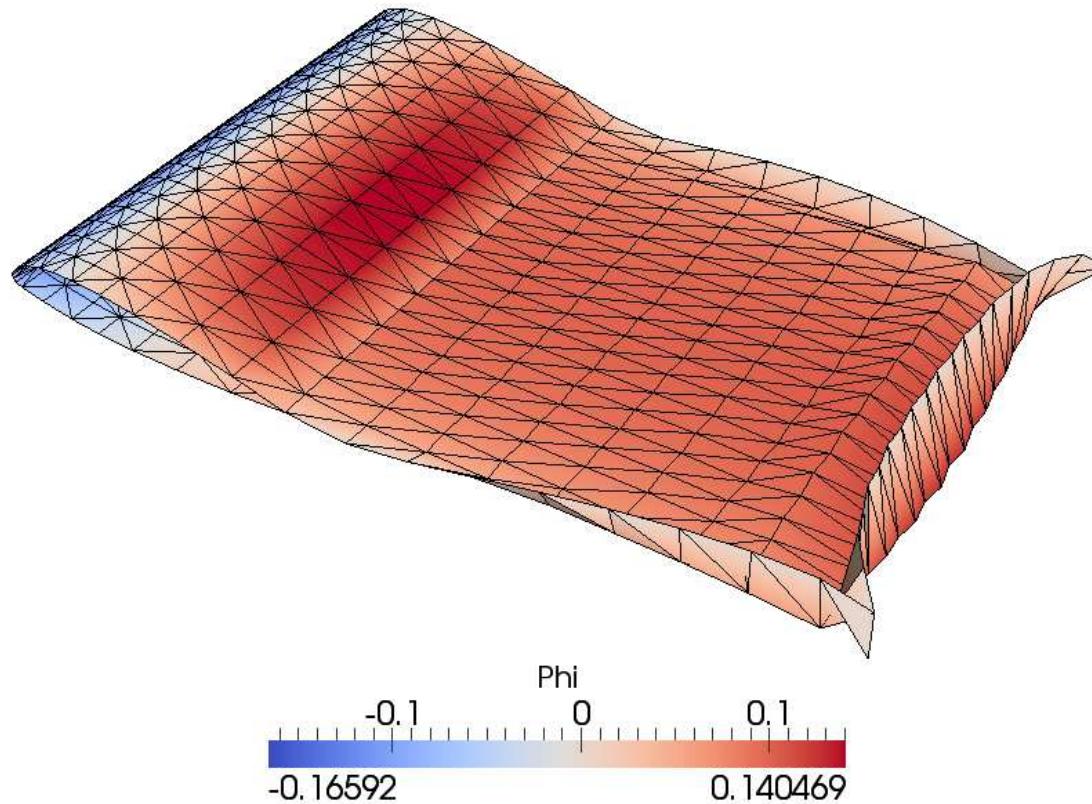
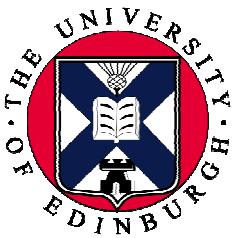


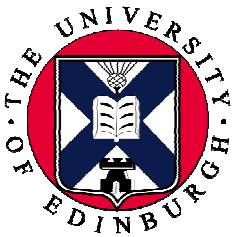
- The original idea was to design a numerical model to simulate a tidal turbine under a free surface.
- A novel solution was attempted for modelling the wake of lifting bodies in a Boundary Element Method.
- Along the way, I verified the free surface part of the model by examining Counter-Propagating Solitary Waves.







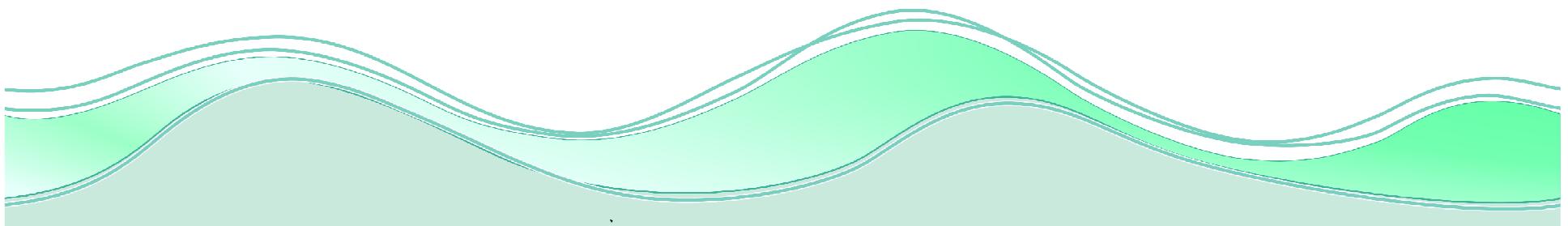
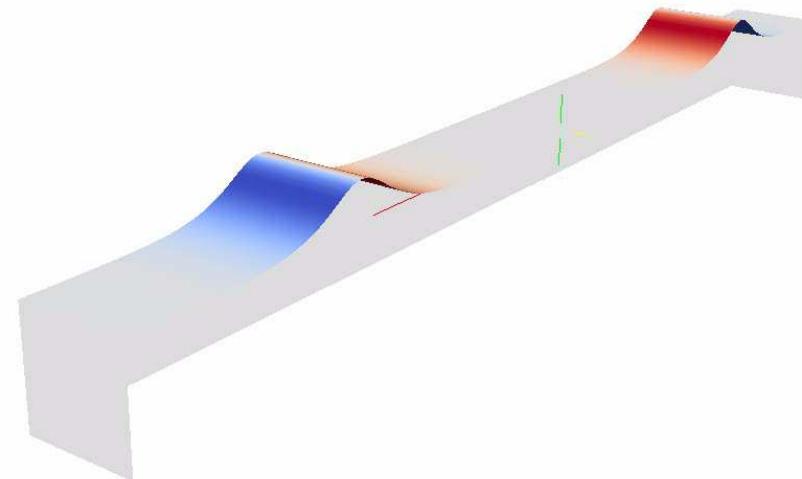


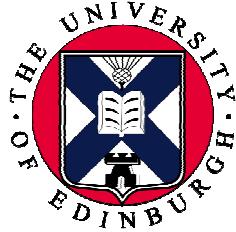


# COUNTER-PROPAGATING SOLITARY WAVES



- Using inviscid flow  
solitary waves maintain  
their form and celerity  
for infinite time.
- With fully non-linear  
surface boundary  
conditions two counter-  
propagating waves will  
alter after a collision.

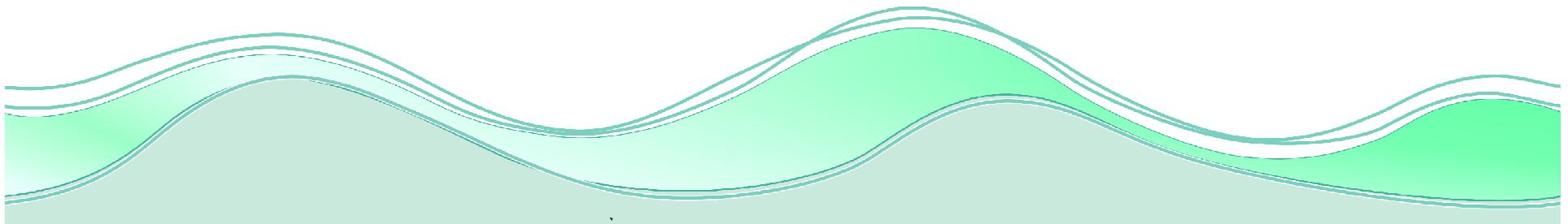


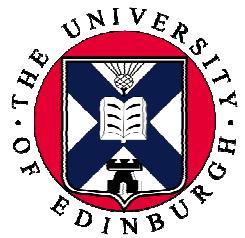


# GENERATING SOLITARY WAVES IN TANKS

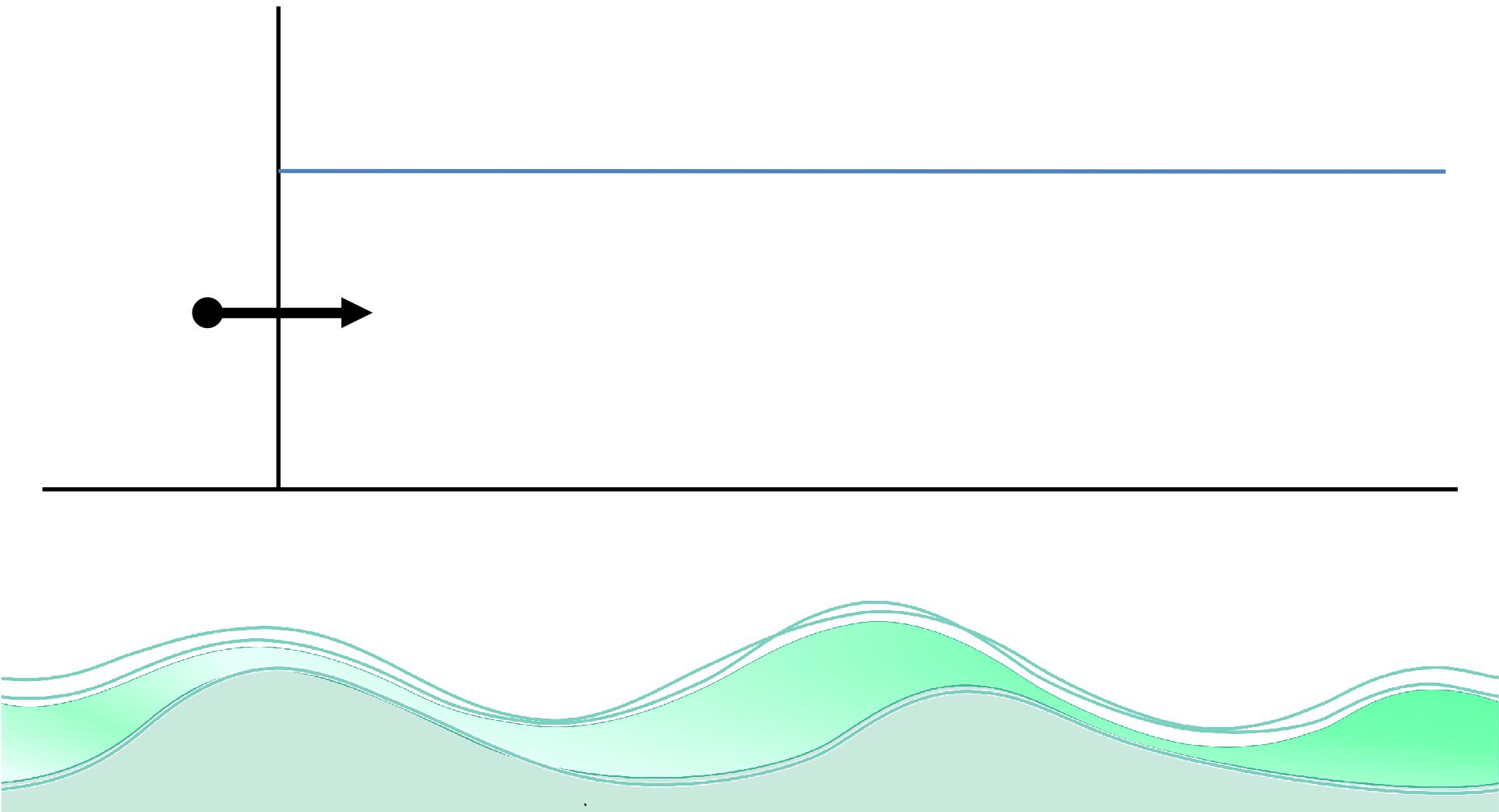


- Normally solitary waves are generated by “dropping” something into a tank or by using a piston type wavemaker.
- Using a hinged flap wavemaker is often overlooked as there are some significant issues.



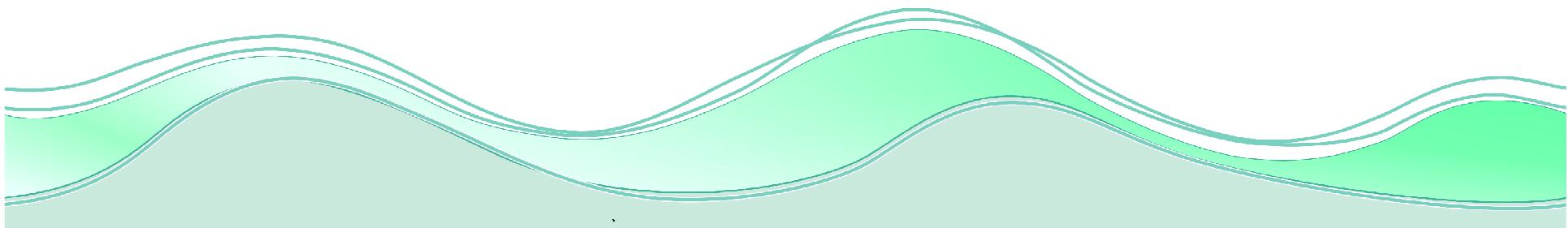
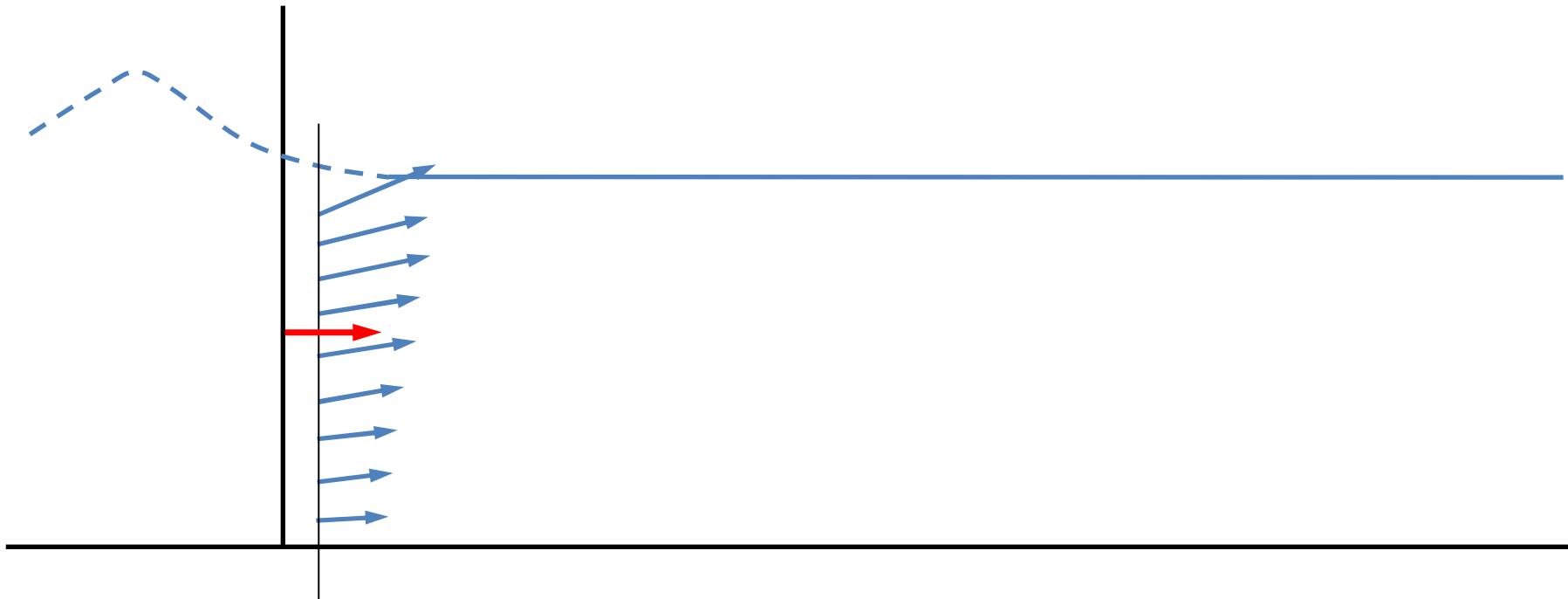


# PISTON FLAP



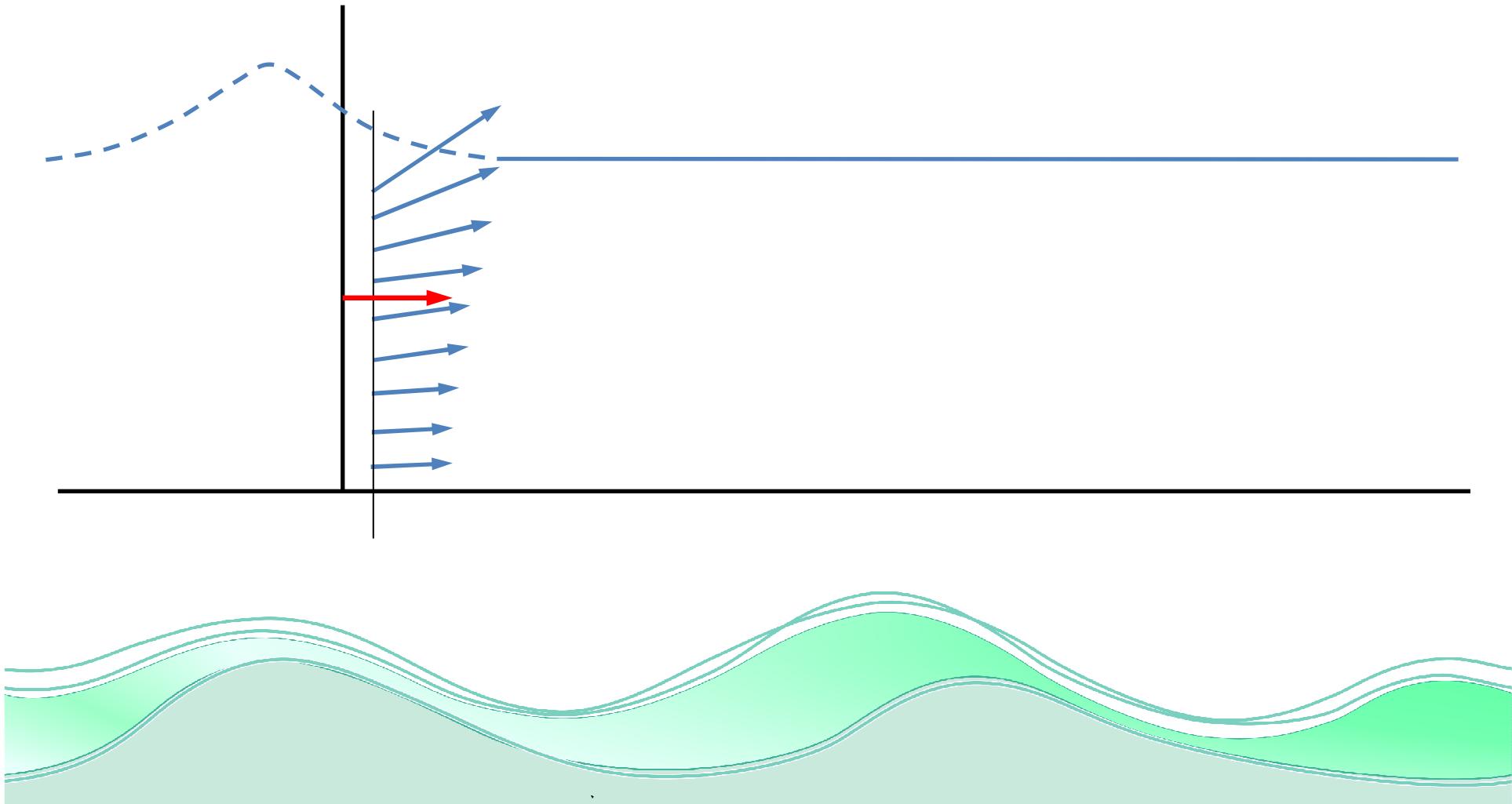


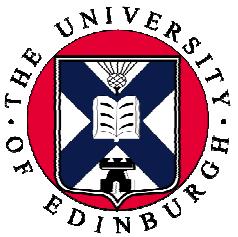
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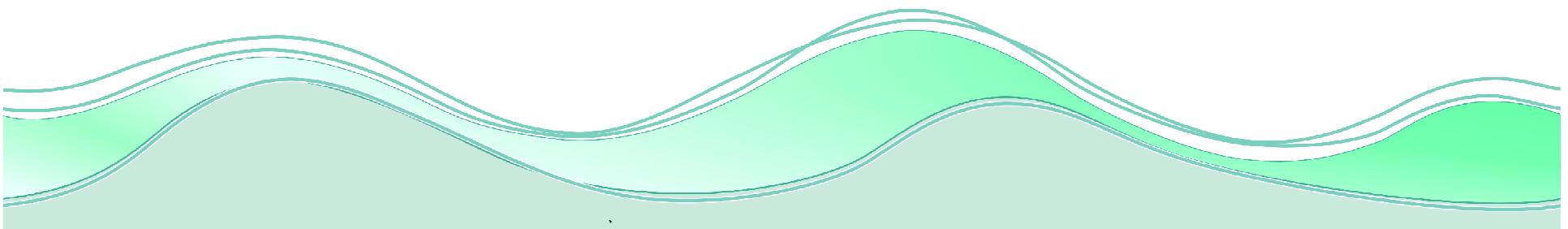
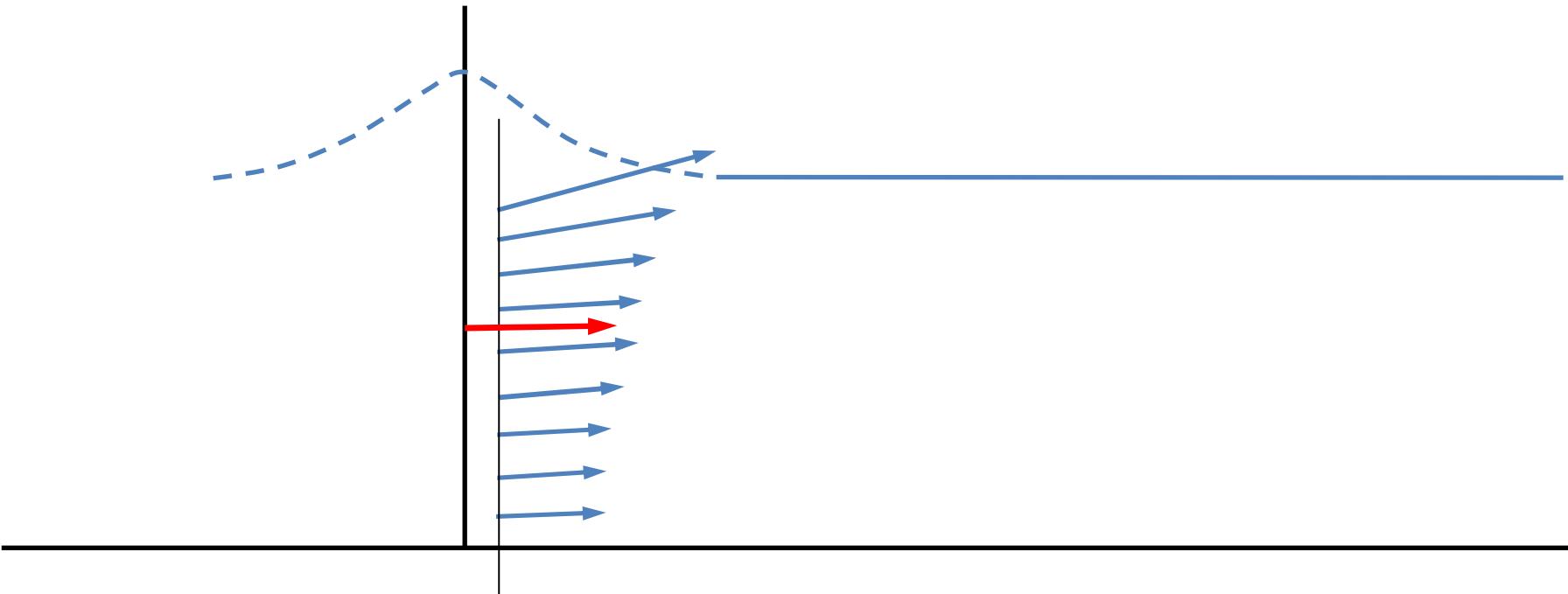


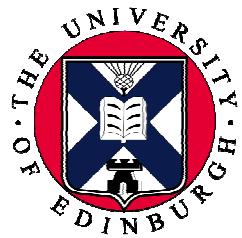
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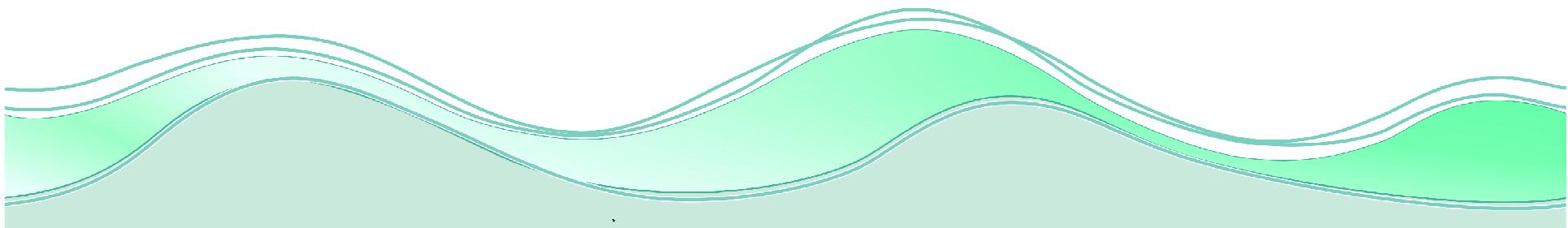
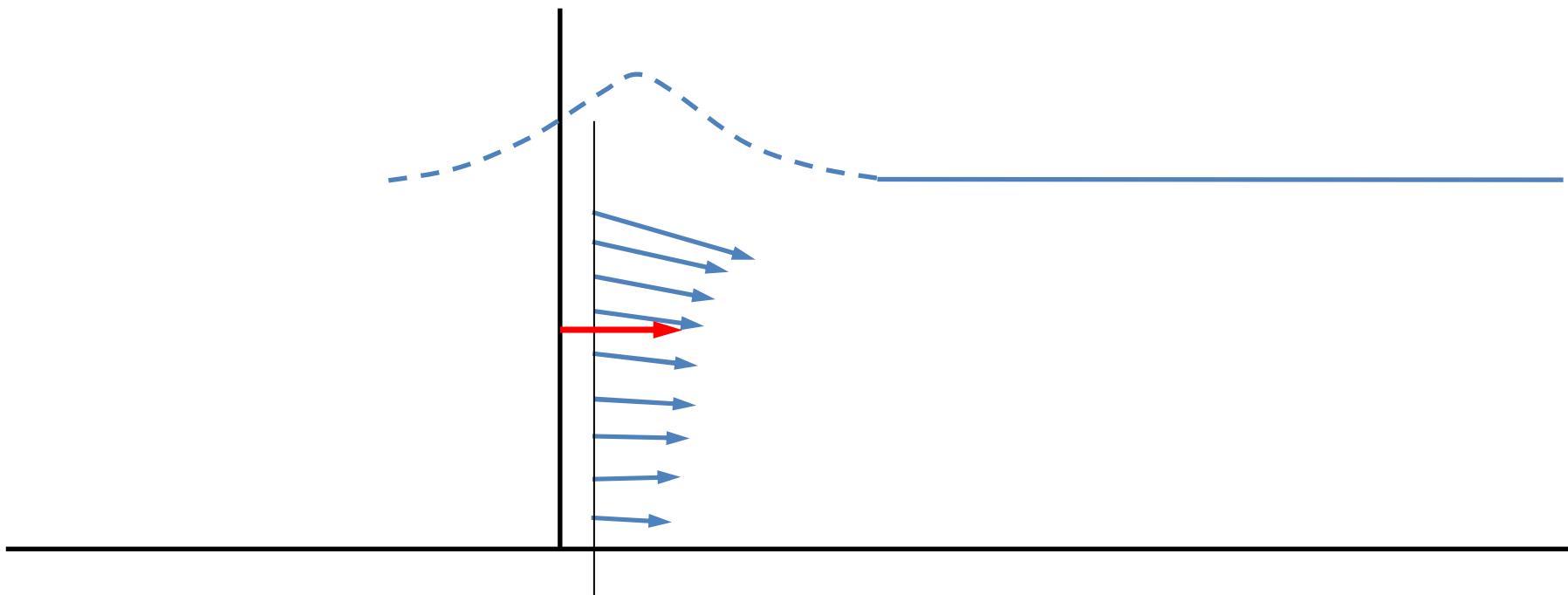


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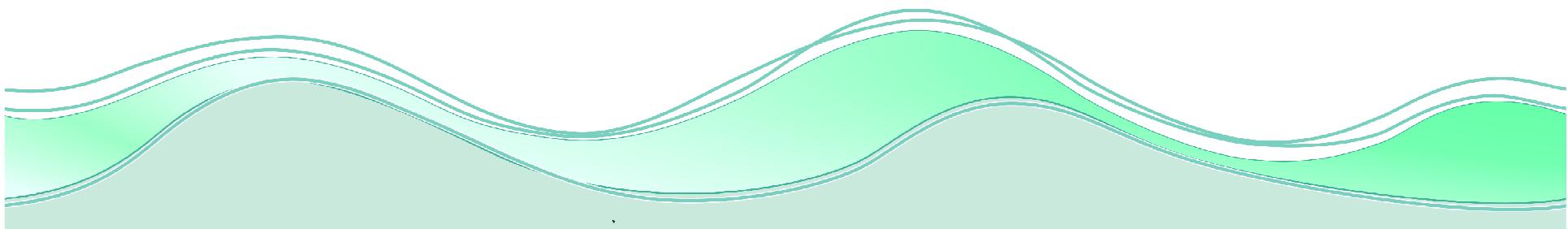
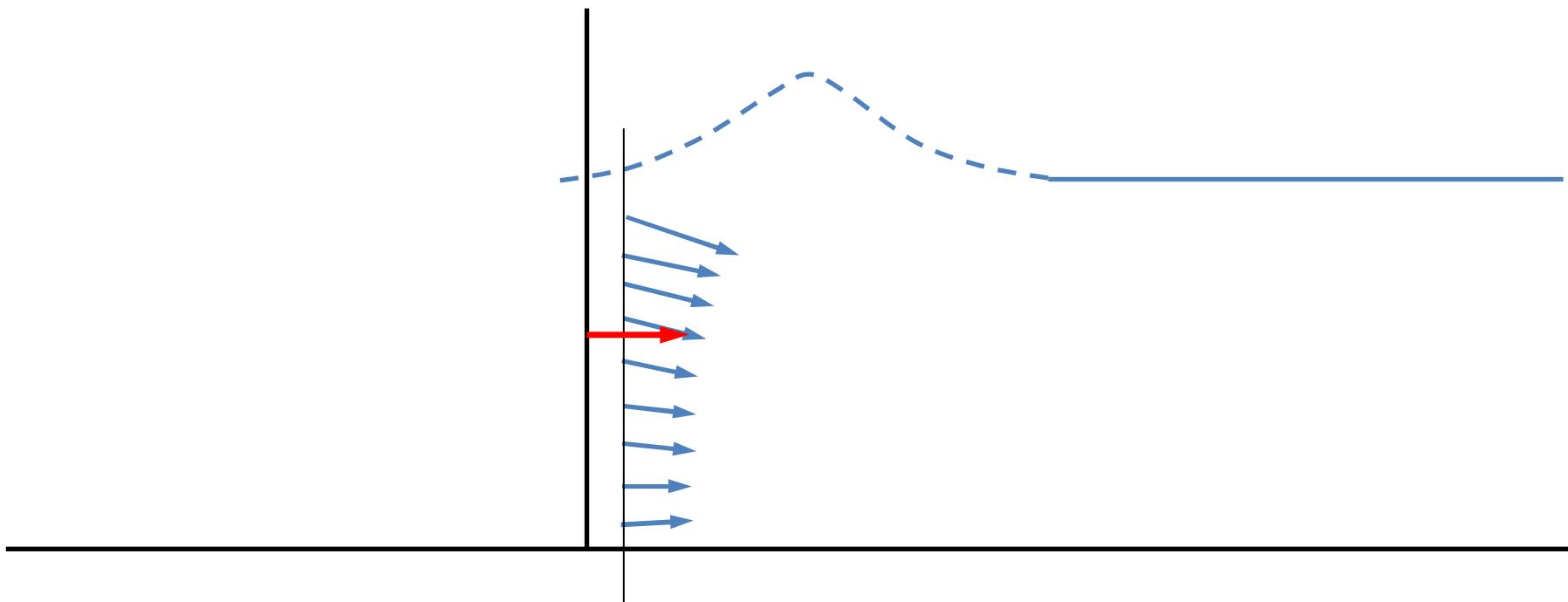


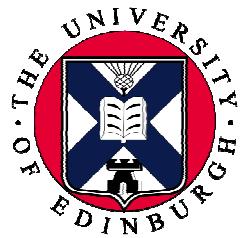
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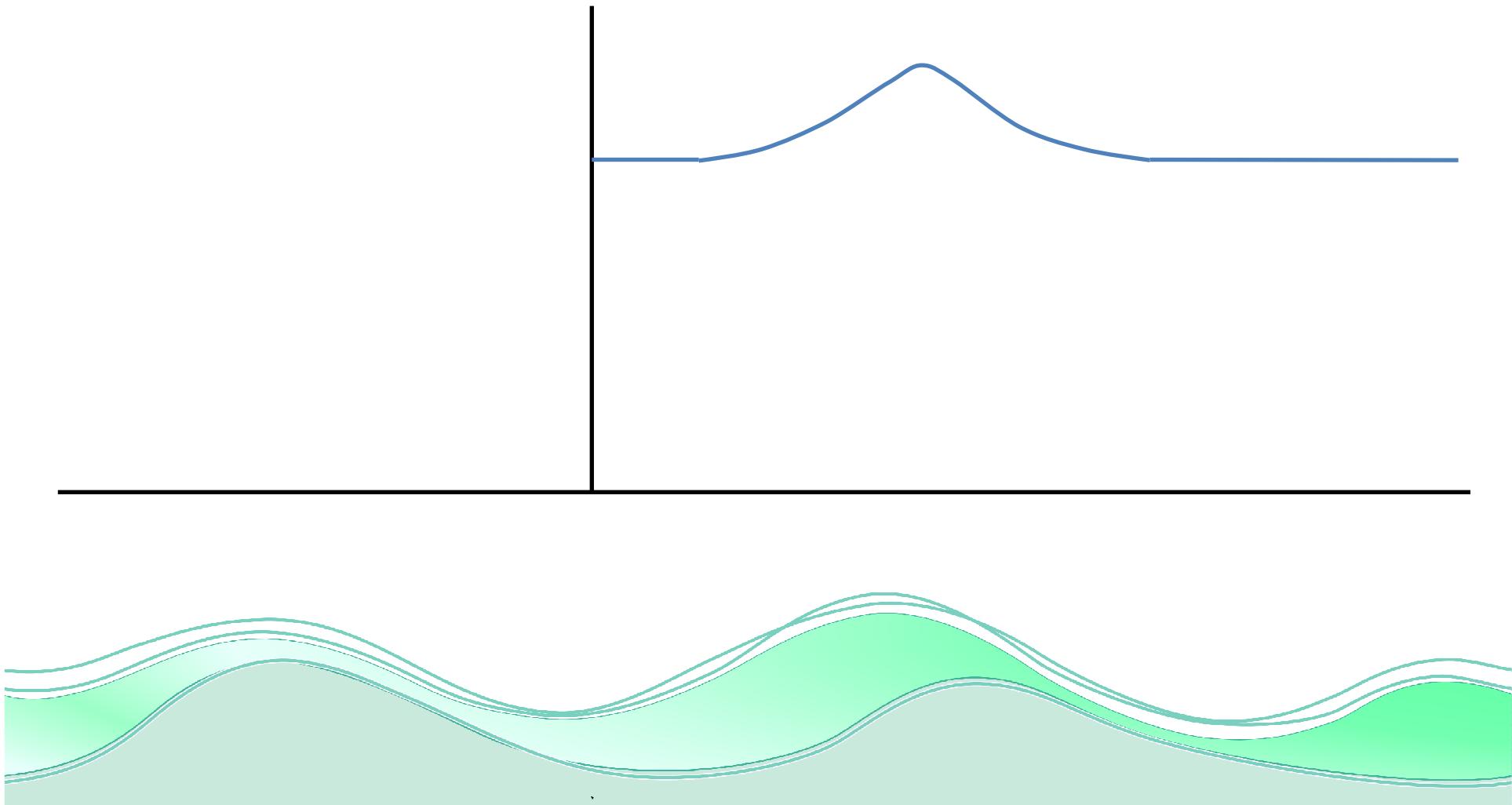


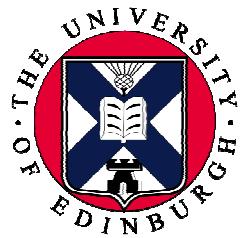
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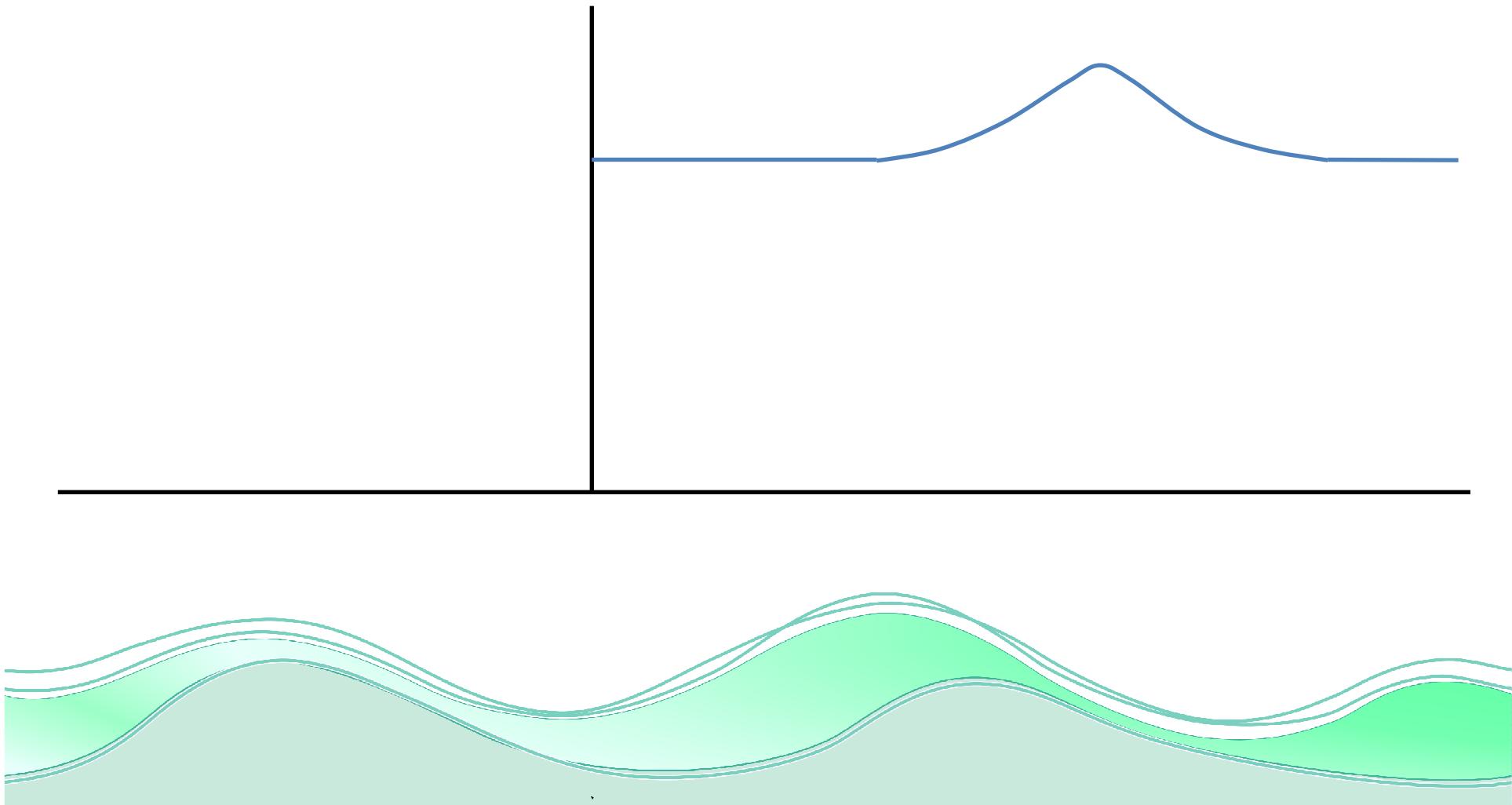


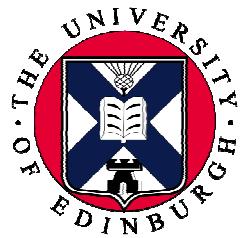
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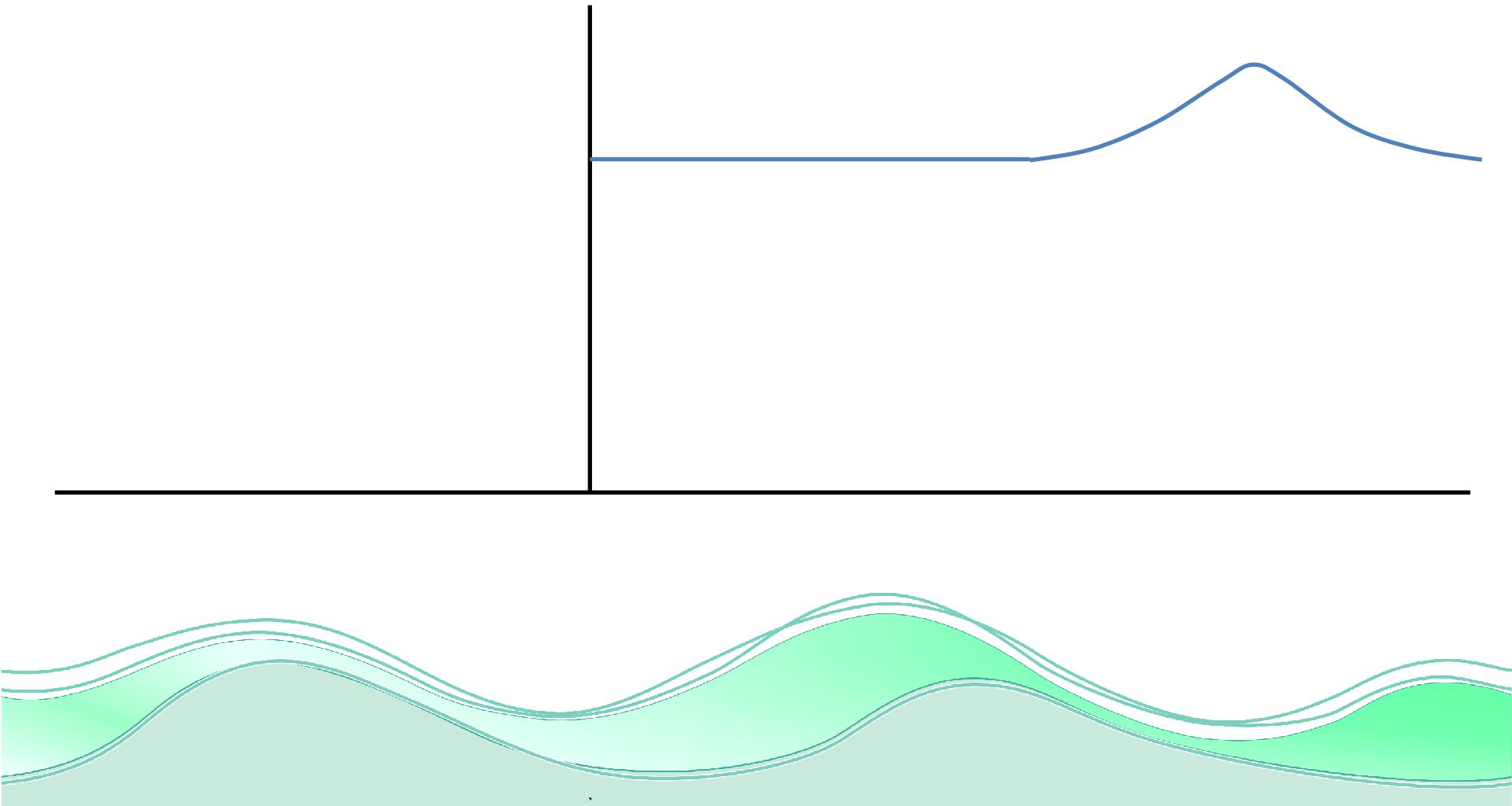


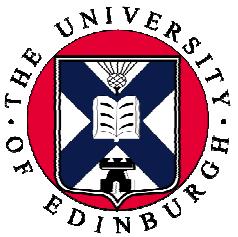
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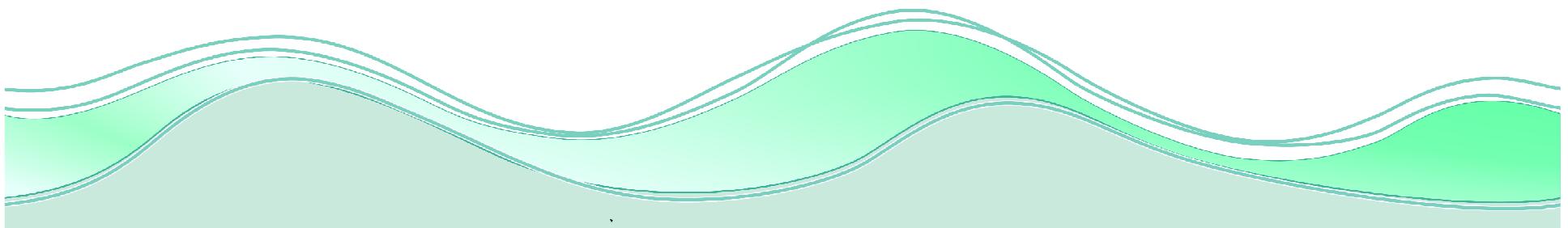
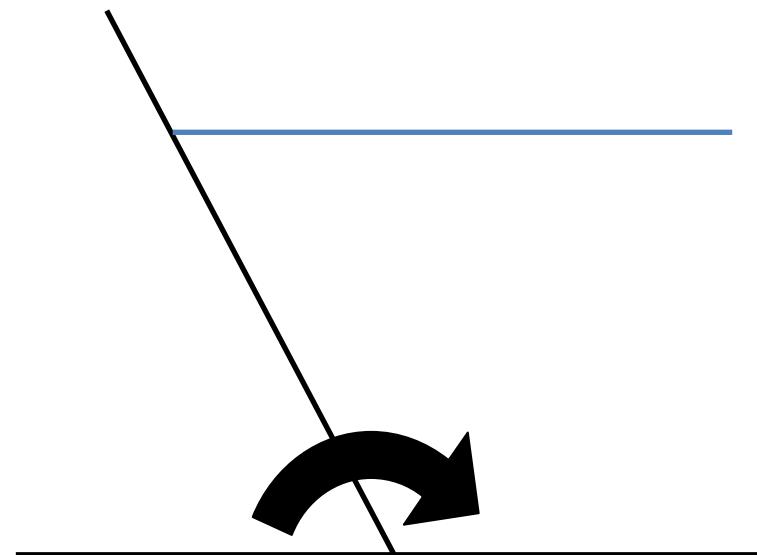


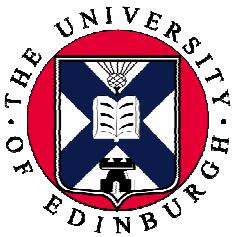
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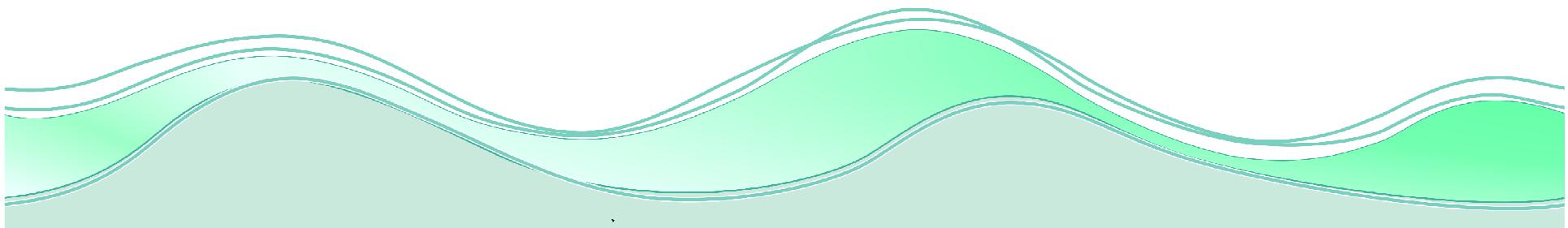
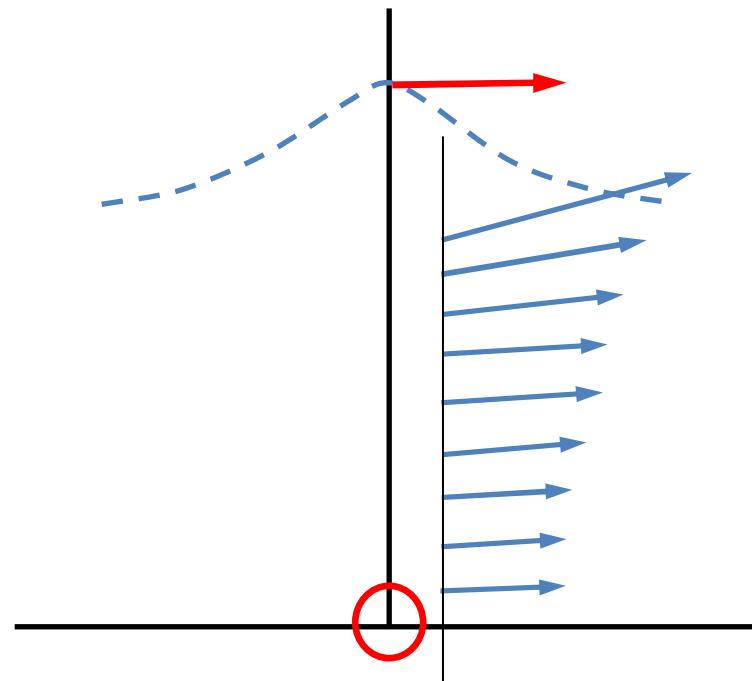


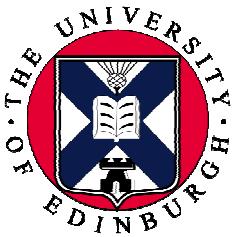
# HINGED FLAP



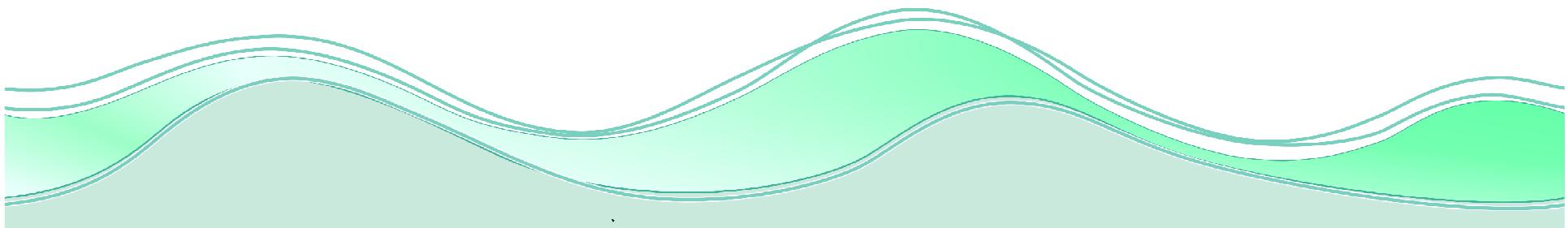
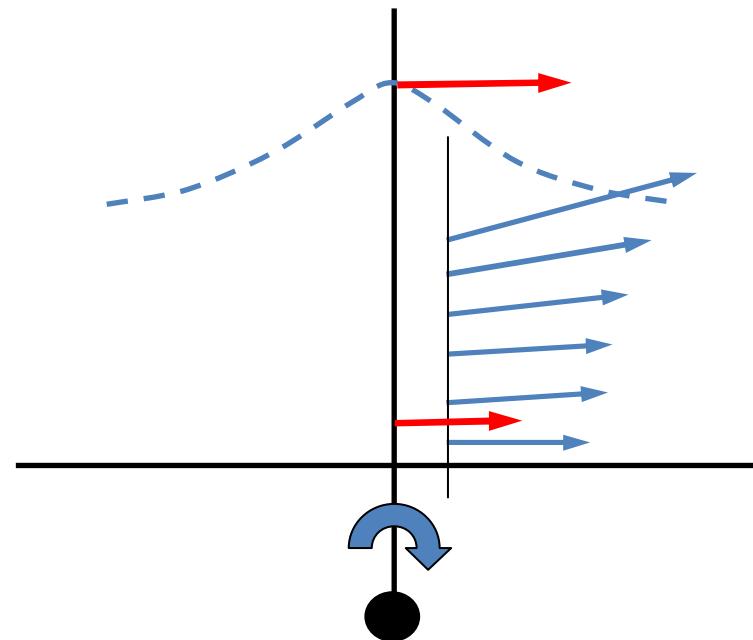


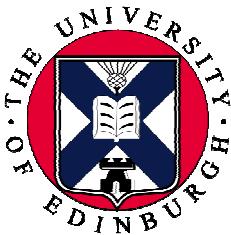
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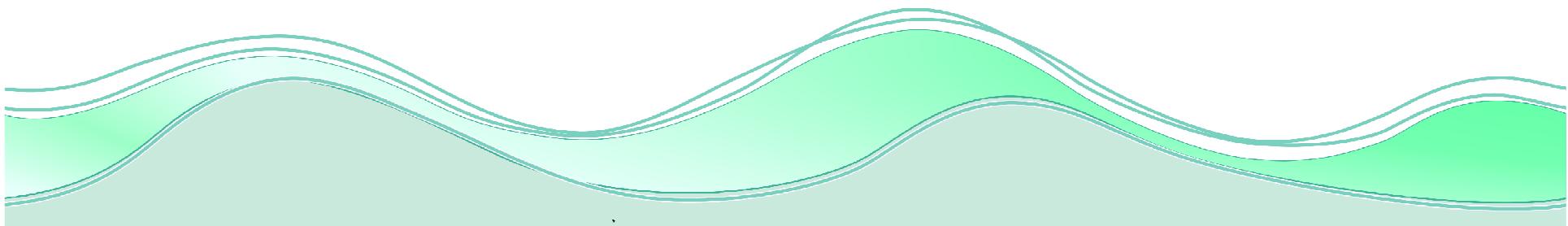
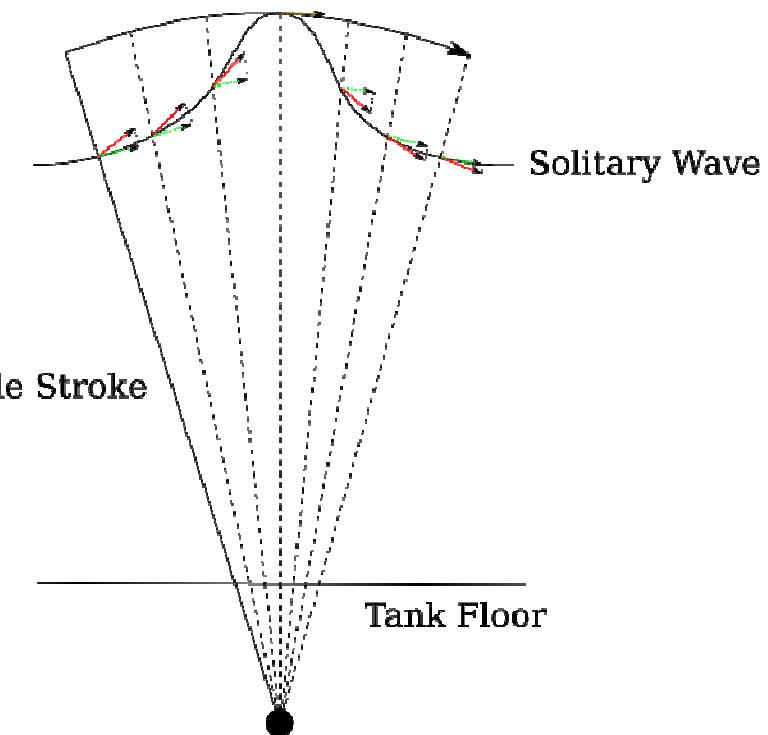


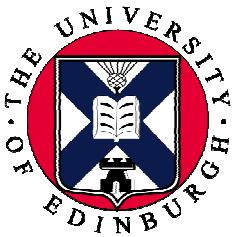


# GENERATING SOLITARY WAVES IN TANKS



- This technique is demonstrated in a conference paper from ESIM, France.
- Interesting theory and practical issues to be solved/reported.
- The generated waves could be compared to the numerical model – possibly the laser wave gauge could pick up the residual waves?

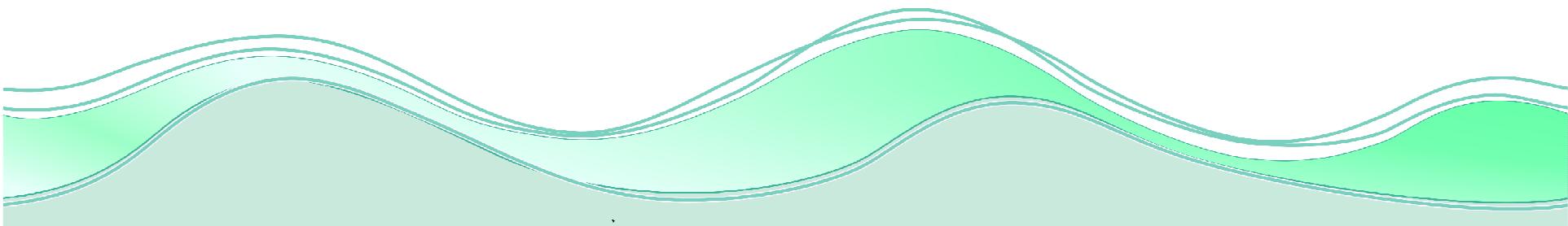


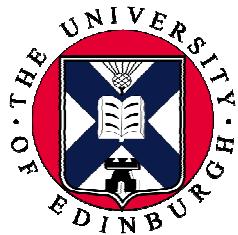


# COLLABORATIVE OPORTUNITIES



- The Starccm+ Wiki
  - <https://www.wiki.ed.ac.uk/display/starccm/Home>
  - Could easily be expanded to include more general CFD issues.
- The FORTRAN users mailing list.
  - Would people consider expanding this to a numerical modelling users group?

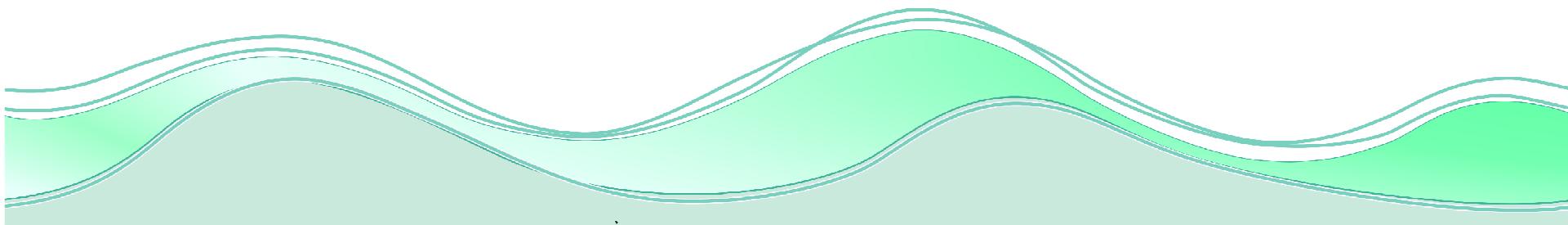




## SOME OTHER WORK...



- I look after the SuperGen website and am getting to know Drupal.
  - <http://www.supergen-marine.org.uk>
- I have also learned to use an animation program called Synfig.
  - And the video that I made in homage to 2001: A Space Odyssey is too silly to show today.
  - But it is on YouTube at:  
[http://www.youtube.com/watch?v=\\_0F6ex0tR60](http://www.youtube.com/watch?v=_0F6ex0tR60)





*fin*

