UMTAS 2021 submission 52

1 message

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To: Siti Ayishah Thaminah Hikmatullah <thaminah1997@gmail.com>

Dear authors,

We received your submission to UMTAS 2021 (15th Virtual International
UMT Annual Symposium 2021):

Authors : Siti Ayishah Thaminah Hikmatullah, Muhammad Zahir Ramli, Mohd Fuad Miskon, Kamaruzzaman Yunus, Effi Helmy Ariffin and Muhammad Hafeez Jeofry
Title : Numerical Modelling of coastal structure using SPH-based DualSPHysics model
Number : 52

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Best regards,
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Master Time Table based on Paper-ID

ID	Date	Session-Parallel	Time	Title	Author	Presenter
50	23/11/2021	2-3	1400	On The Existence And Uniqueness Of The Solution Of An Infinite First Order 3-System Of Differential Equations	Diviekga Nair Madhavan And Idham Arif Alias	Diviekga Nair Madhavan
51	25/11/2021	1-1	1050	Modelling Approach In Assessing And Predicting The Trajectory And Spatial Distribution Of Floating Plastic Debris In Coastal Water Of East Coast Peninsular Malaysia	Muhammad Afiq Azman, Muhammad Zahir Ramli, Hooi Bein Goh And Zuraini Zainol	Muhammad Afiq Azman
52	25/11/2021	1-1	1105	Numerical Modelling Of Coastal Structure Using SPH-Based Dualsphysics Model	Siti Ayishah Thaminah Hikmatullah Sahib, Muhammad Zahir Ramli, Mohd Fuad Miskon, Kamaruzzaman Yunus, Effi Helmy Ariffin And Muhammad Hafeez Jeofry	Muhammad Afiq Azman
53	24/11/2021	1-5	1110	Diversity Of Decapod Crustaceans In Bidong Islands, Terengganu	Amirrudin Ahmad, Mohamad Aqmal-Naser, Muhammad Fahmi-Ahmad And Syed Ahmad Rizal	Siti Ayishah Thaminah Hikmatullah Sahib
54	24/11/2021	2-4	1235	Morphometric Variations Among Nemipterus Species From Pahang Coastal Water	Ummi Fatimah Daud Laksamana And Mohammad Mustafizur Rahman	Ummi Fatimah Daud Laksamana
55	24/11/2021	2-5	1135	Validating The Feasibility Of Cre-Loxp Recombination System For Pyrg Marker Recycling In Aspergillus Niger	Nurhaida Kamaruddin, Reginald Storms, Nor Muhammad Mahadi, Rosli Md. Illias, Farah Diba Abu Bakar And Abdul Munir Abdul Murad	Nurhaida Kamaruddin
56	24/11/2021	2-5	1150	Species Richness And Composition Of Snakes In Sekayu Lowland Forest, Terengganu, Peninsular Malaysia	Muhamad Fatihah-Syafiq, Baizul Hafsyam Badli-Sham, Noor Shahirah-Ibrahim, Mohammad Aqmal-Naser, Muhammad Fahmi-Ahmad, Syed Ahmad Rizal And Amirrudin B Ahmad	Muhamad Fatihah-Syafiq
57	24/11/2021	2-4	1250	Microbiota Of The Corallivorous Snail, Drupella Spp. (Mollusca: Gastropoda) From Pulau Tenggol Marine Park, South China Sea	Afiq Durrani Mohd Fahmi, Nur Iman Aliailani Rameli, Izwandy Idris And Nursalwa Baharuddin	Afiq Durrani Mohd Fahmi
58	24/11/2021	4-5	1610	Effect Of Nano Particle Additive On Biodiesel Fuel In Diesel Engines: A Review	Amirah Nur Fhatihah Mohamad Riza And Ts. Dr. Che Wan Mohd Noor Che Wan Othman	Amirah Nur Fhatihah Mohamad Riza
59	23/11/2021	3-1	1540	Effects Of Praseodymium And Cobalt Oxide Doping On The Microstructure And Electrical Characteristics Of Zno Varistors	Syaizwadi Shaifudin And Mohd Sabri Mohd Ghazali	Syaizwadi Shaifudin
60	23/11/2021	2-3	1415	Parametrization Of SIRD Epidemic Model Using Markov Chain Monte Carlo Method	Muhammad Fahmi, Norhayati Rosli And Noryanti Muhammad	Muhammad Fahmi
61	23/11/2021	3-2	1540	Detection Of Distorted Points On Images Of Micro-Objects Based On The Properties And Peculiarities Of The Wavelet - Transformation	Lativ Xurramov, Isroil Jumanov And Rustam Safarov	Lativ Xurramov
62	23/11/2021	3-2	1555	Error Control Of Identification And Filtering Of Micro-Object Images	Isroil Jumanov, Olim Djumanov And Rustam Safarov	Isroil Jumanov
63	23/11/2021	2-3	1430	Derivations And Automorphisms Of Two-Dimensional Real Algebras.	Dilmurod Bekbaev	Ilmurod Bekbaev
64	24/11/2021	2-5	1205	Investigating The Amphibians Biogeography In The Malay Peninsula: Distribution Data, Methods And Resolution	Baizul Hafsyam Badli Sham And Amirrudin Ahmad	Baizul Hafsyam Badli Sham
65	23/11/2021	3-1	1555	Synthesis Of Copper Supported On Diapers Char As Green Catalyst For The Carboxylation Of Glycerol	N A Rozulan And N A Razali	N A Rozulan
66	23/11/2021	3-1	1610	Factors Encouraging Ecological Behavior Into Institutions Of	Juhari Noor Faezah And Mohd Yusoff Yusliza	Juhari Noor Faezah

Numerical Modelling of coastal structure using SPH-based DualSPHysics model

S A T Hikmatullah Sahib[1], M Z Ramli[2], M F Miskon[2], K Yunus[1], E H Ariffin[3], M H Jeofry[3]

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Abstract. Coastal structures are implemented along the coasts as measures to counter coastal erosion and the detrimental effects caused by sea waves. In order to maximize the efficiency of these structures, sea conditions during extreme events should be taken into consideration as to avoid the occurrence of wave overtopping, erosion and thus leading to structure failure. This study with the objective to identify the force exerted on several coastal structures and overtopping occurrence under a variety of wave conditions will be compared with the numerical results done by Dang et al., (2021). This study, however, focuses on three different structures; the vertical wall, the trapezoidal wall and the stepped wall, and is simulated using DesignSPHysics, a new addition to the open-source code named DualSPHysics. A simulation with no coastal structure is also presented in this study. The cases take damping systems into account, particularly active wave absorption system. Furthermore, overtopping simulations were conducted as to assess the various structures under the chosen wave conditions. Results signifies that, the stepped wall has the least overtopping occurrence in comparison to the other structures. The simulation presented in this study well replicates that of the study done by Dang et al., (2021).

Keywords: Coastal Structures, Overtopping, DualSPHysics, Smoothed Particle Hydrodynamics, Numerical Modelling

Numerical Modelling of coastal structure using SPH-based DualSPHysics model

UMTAS 2021

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- DUALSPHYSICS
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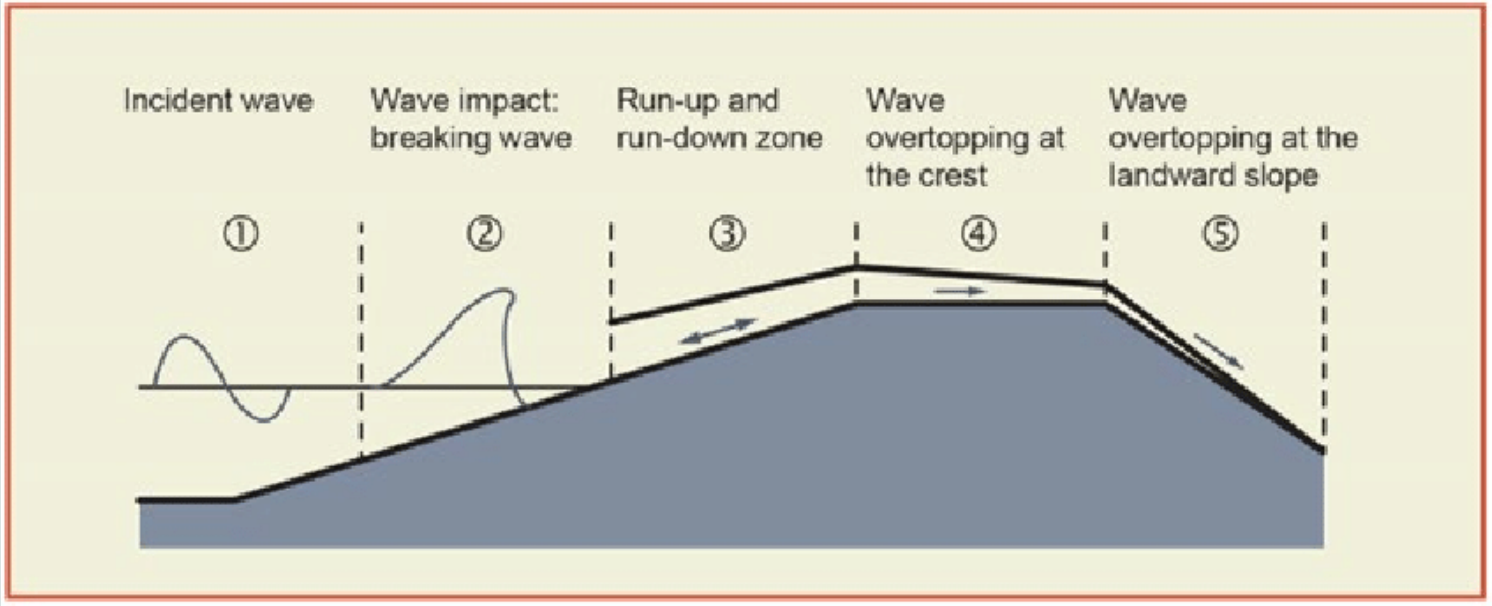
Introduction – Wave Overtopping

- Important hydraulic response of a coastal structure.
- Occurs when crest height is lower than the run-up level of the highest waves.
- Significantly affect functional efficiency and structural safety of structures.



Introduction – Measuring Qualities

Overtopping

- Referring to the available database (CLASH and Neural Network)
- Undergoing experiment in wave flume/ Physical Model.
- Numerical modelling

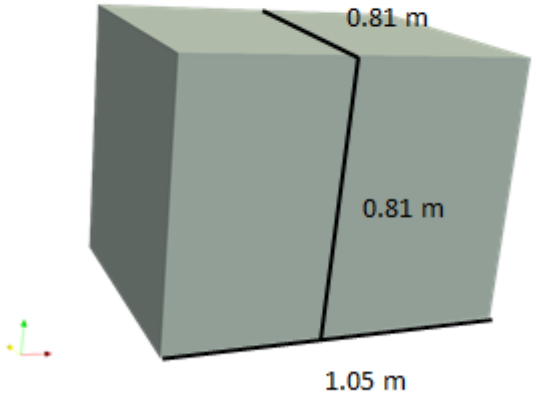
Forces

- Application of Formulas
- Numerical model

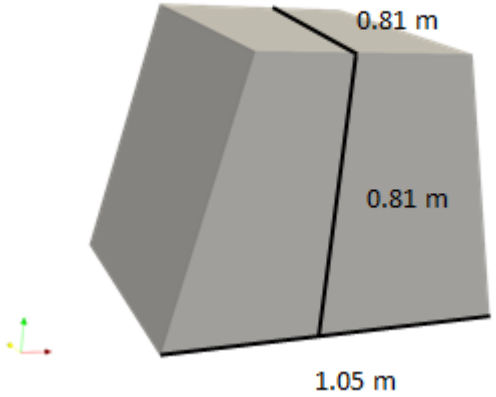
DualSPHysics

- Is a software based on the Smoothed Particle Hydrodynamic model known as SPHysics.
- It is developed to study free-surface flow phenomena where Eulerian methods are difficult in application.
- Method used is a Lagrangian meshless method (widely used in the field of CFD)
- Particles represent flow, interaction and significant deformation with the boundary.
- Current code: DualSPHysics can run on multi-GPUs

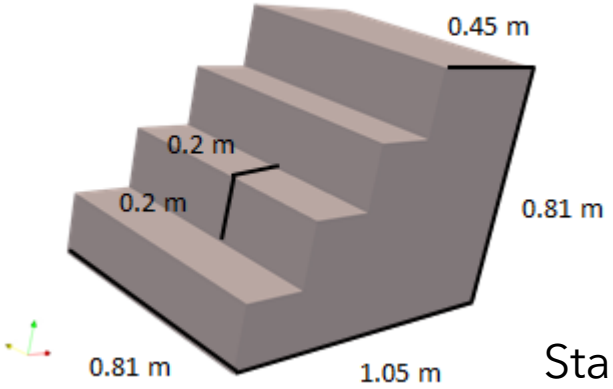
Numerical Setup



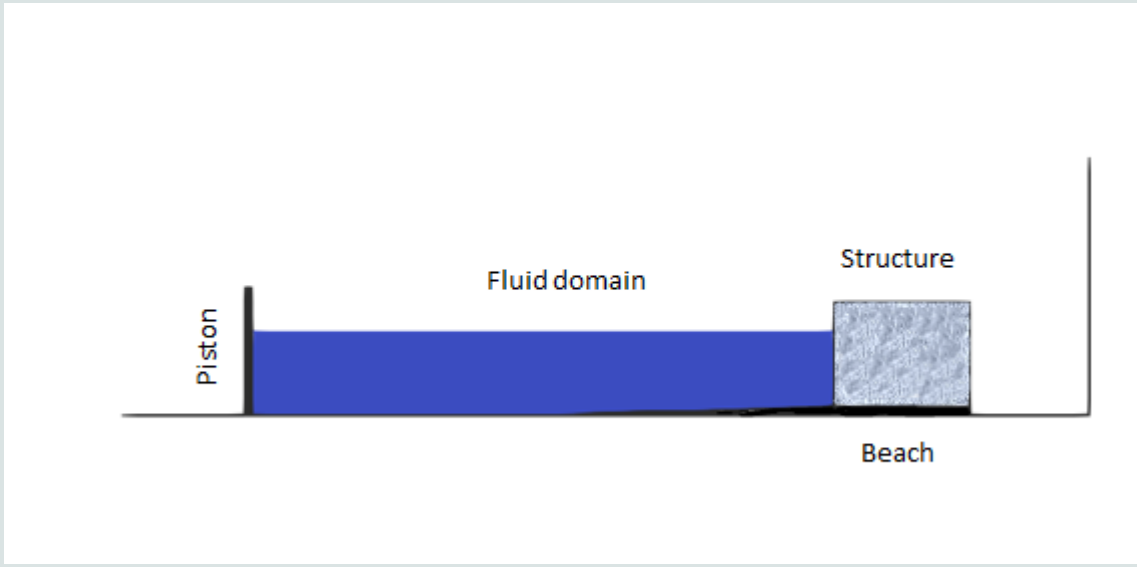
Vertical Wall

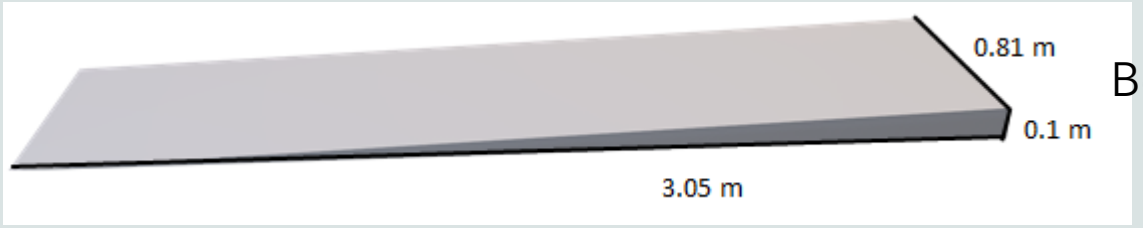


Trapezoidal Wall



Staired Wall





Beach

Wave Parameters

Non-Breaking Wave Parameters:

1) ***H: 0.10 m, T: 2.0 s, d: 0.60 m***

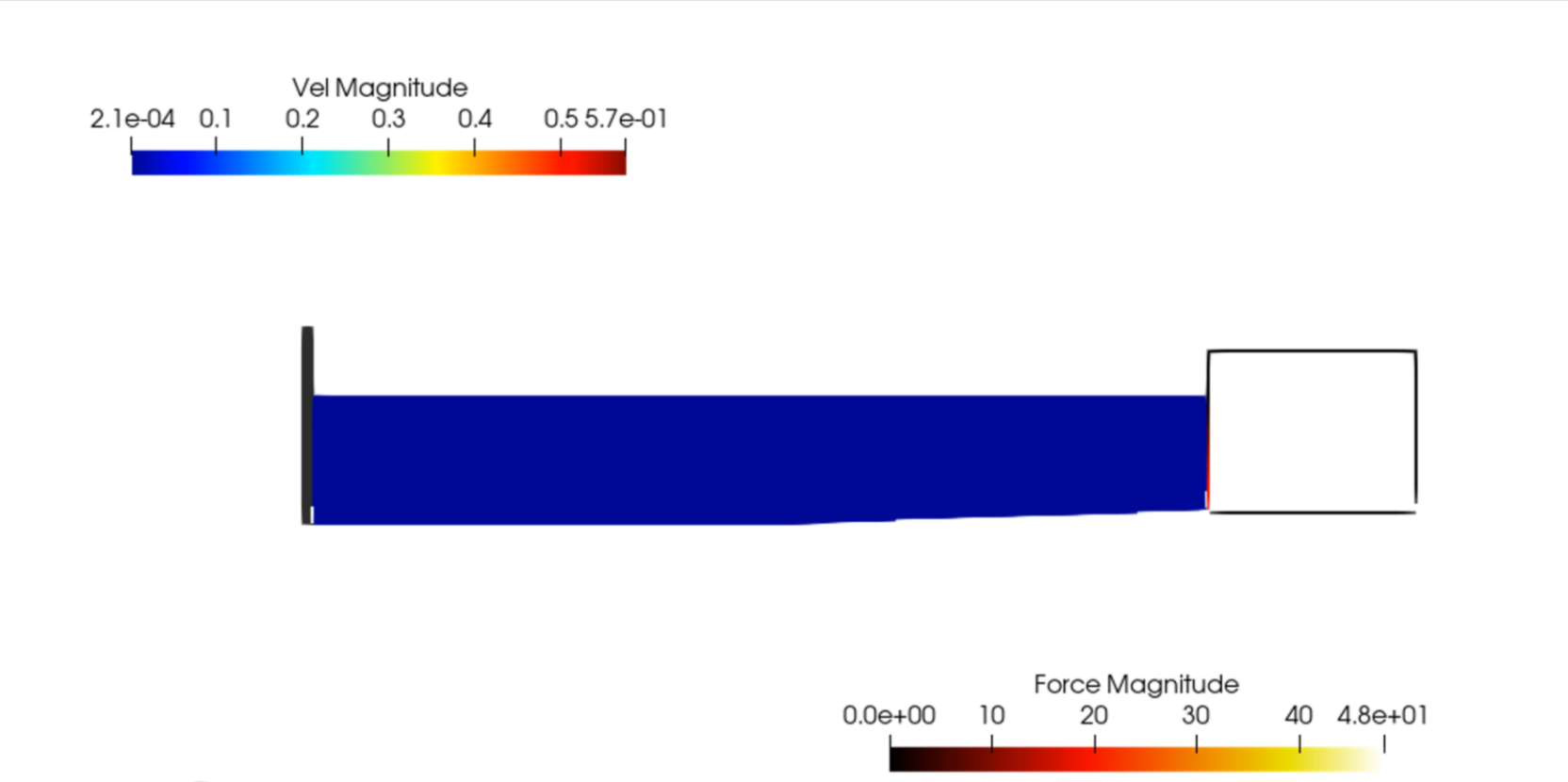
2) H: 0.11 m, T: 2.2 s, d: 0.60 m

3) H: 0.12 m, T: 1.8 s, d: 0.60 m

Breaking Wave Parameter:

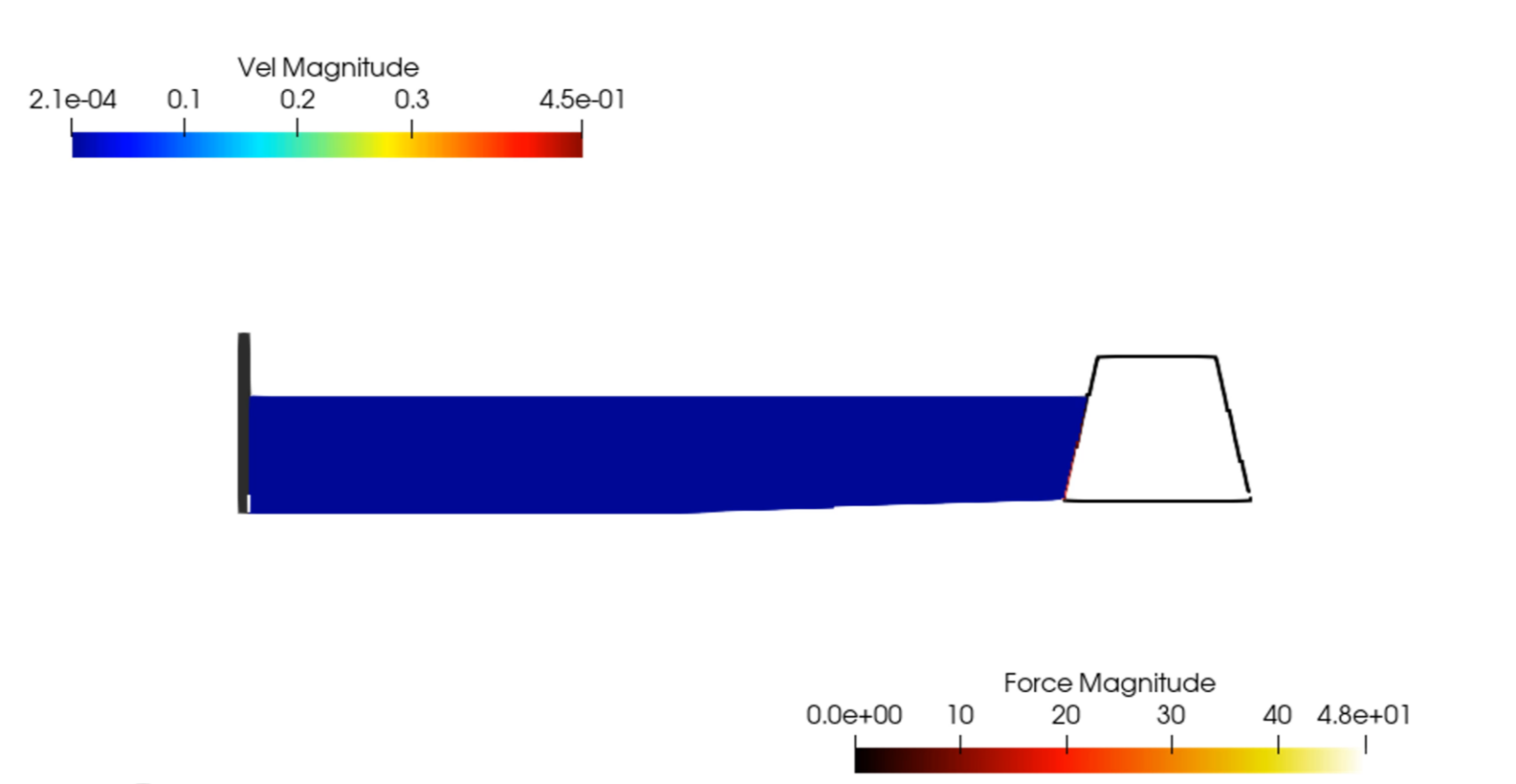
1) ***H: 0.25 m, T: 2.2 s, d: 0.65 m***

Non-Breaking Wave - Vertical Wall



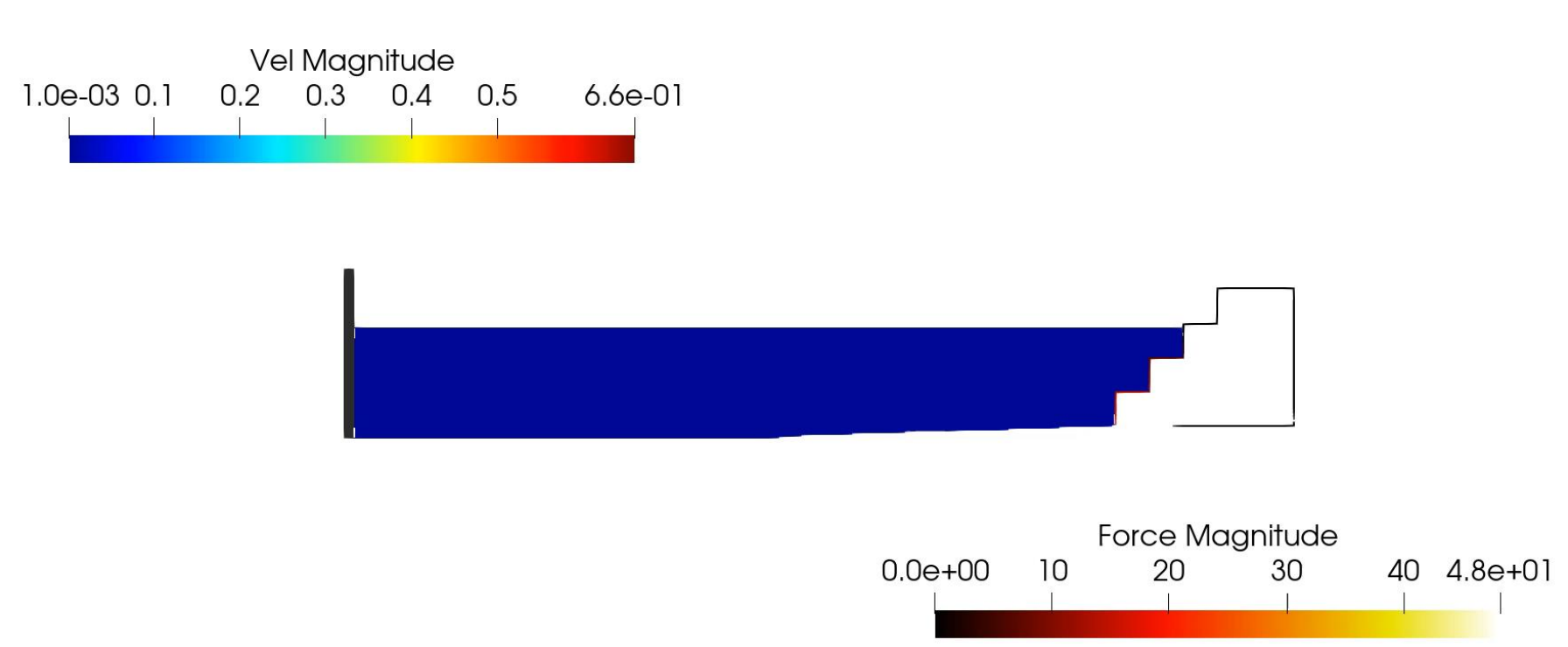
Maximum Horizontal Force: 4.1 sec, 1773 N/m

Non-Breaking Wave - Trapezoidal Wall



Maximum Horizontal Force: 14.15 sec, 1778 N/m

Non-Breaking Wave - Staired Wall

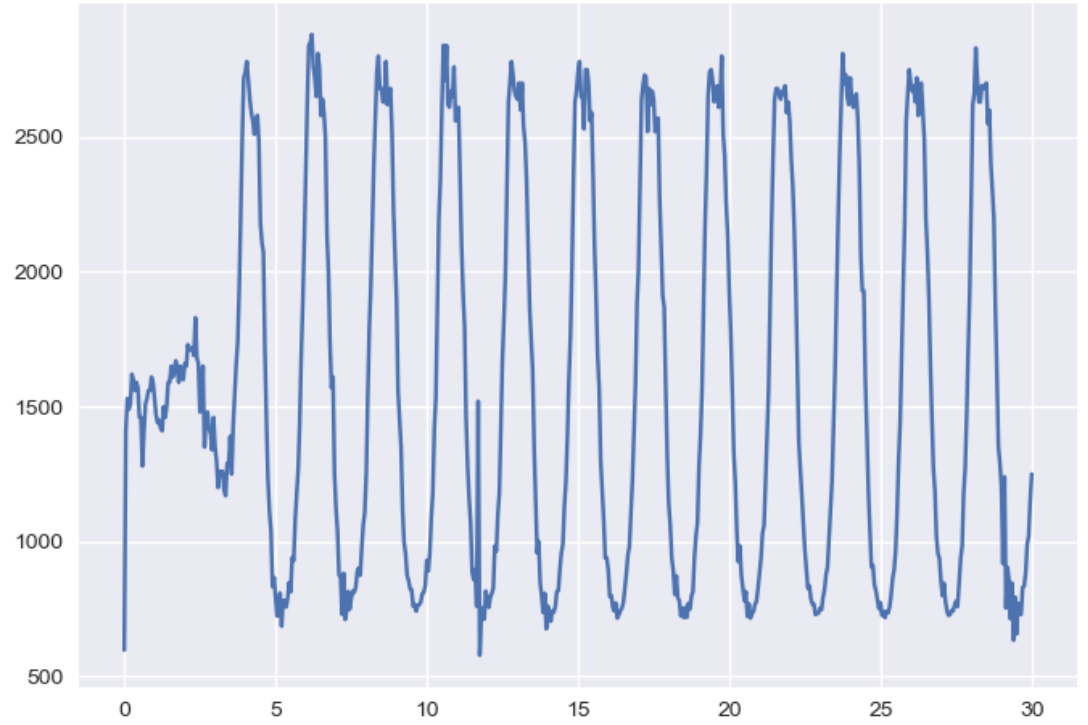


Maximum Horizontal Force: 12.25 sec, 1756 N/m

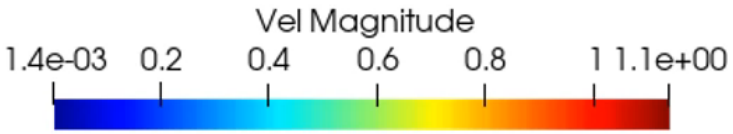
Numerical & Analytical

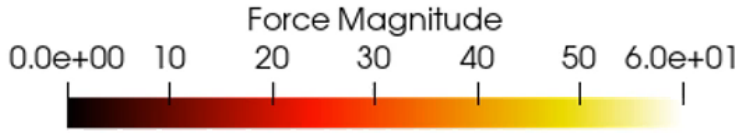
	Vertical Wall			Trapezoidal		
	W1	W2	W3	W1	W2	W3
Numerical-Maximum Horizontal Force [N/m]	1773.57	1954.73	1846.77	1778.61	1926.29	1821.90
Analytical Bao-Maximum Horizontal Force [N/m]	1734.70	1817.50	1793.70	1715.20	1794.60	1772.10
Error (%)	2.24	7.55	2.96	3.70	7.34	2.81
Average Error (%)		4.25			4.62	

Breaking Wave - Vertical Wall

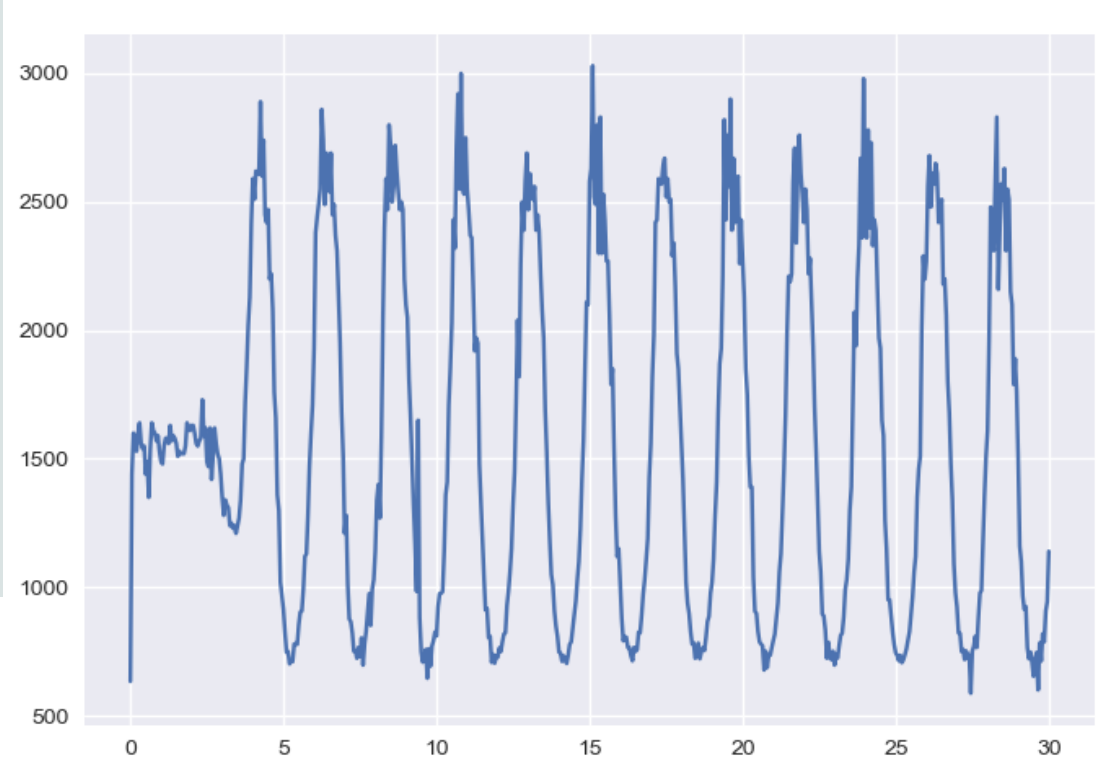


Maximum Horizontal Force: 6.2 sec, 2875 N/m

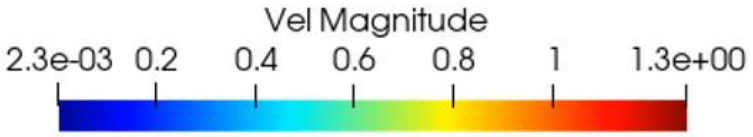


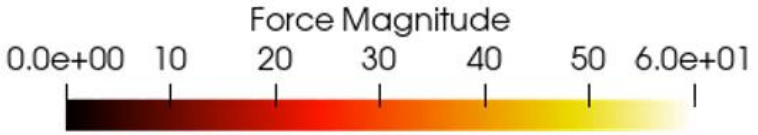


Breaking Wave – Trapezoidal Wall

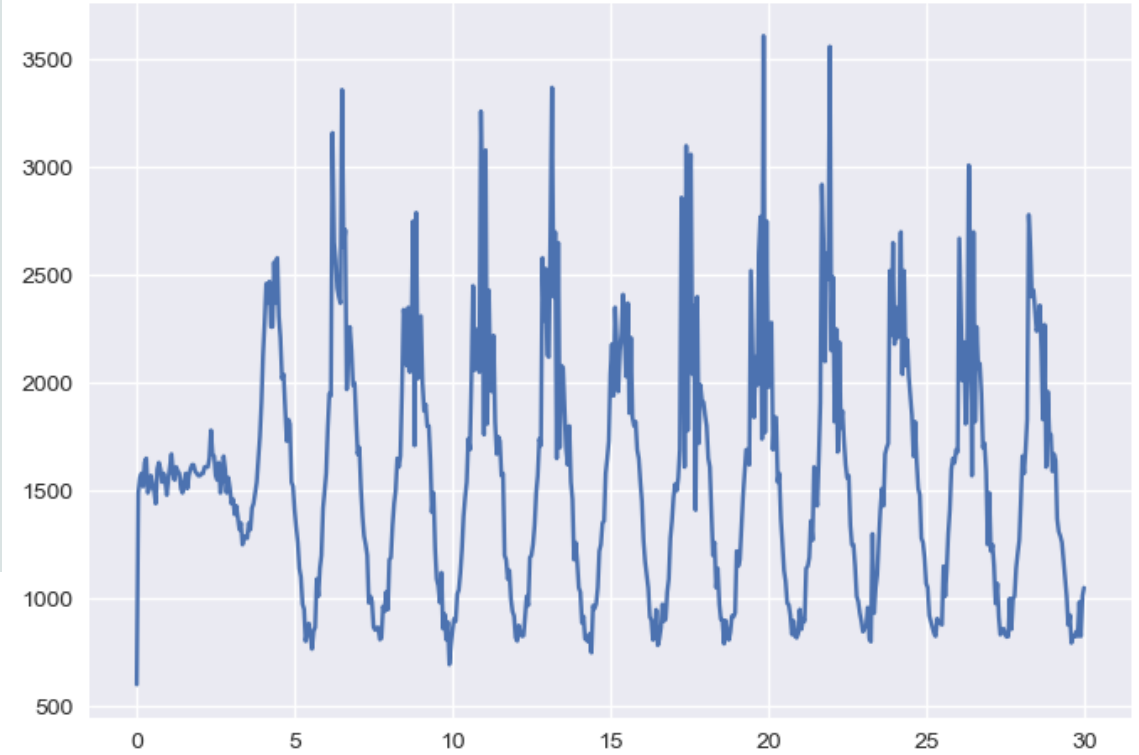


Maximum Horizontal Force: 15.1 sec, 3033 N/m

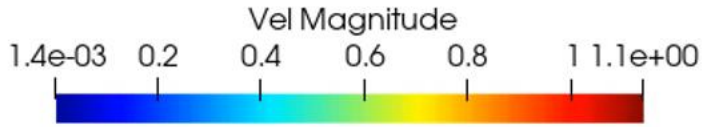


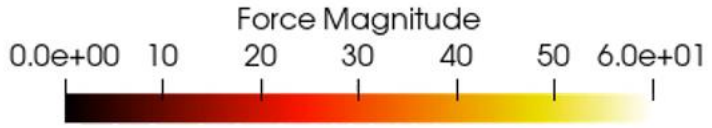


Breaking Wave – Staired Wall



Maximum Horizontal Force: 19.8 sec, 3609 N/m





Conclusion

1) Overtopping (Greatest to Least):

Vertical

Trapezoidal

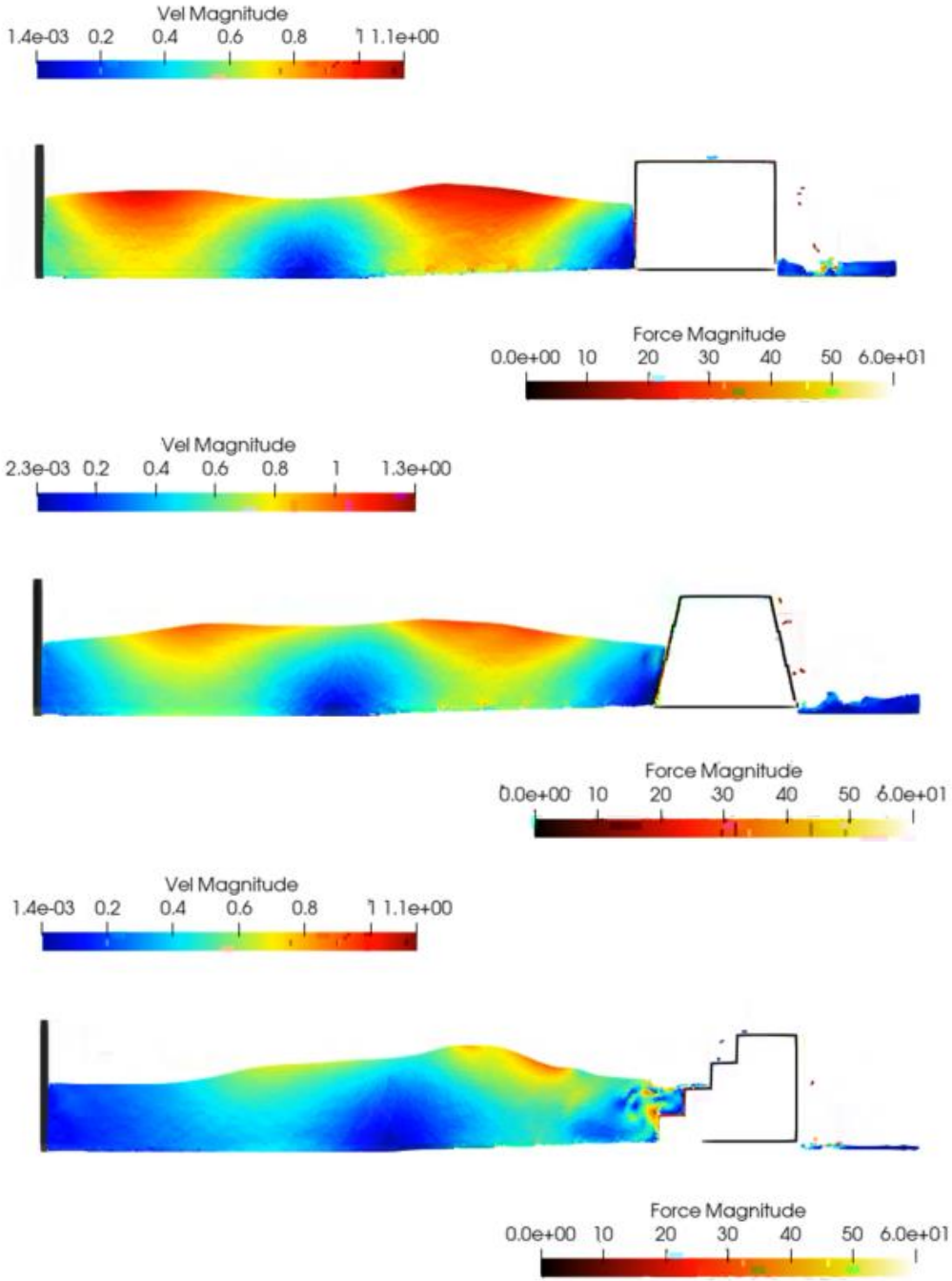
Staired

2) Force (Greatest to Least):

Staired

Trapezoidal

Vertical



Thank you

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