ACSE 4.3 SPH Feedback sheet

Group: Iubhair

	Comments	**Grade**
Software		
Functionality	The code runs for the 30 seconds that are required. The predictor-corrector is not correctly implemented (the acceleration and density derivative needs to be recalculated at each half step). Containment is implemented, but in a manner that may cause issues/artefacts. Decent wave tracking algorithm, but no real convergence analysis. No implementation of arbitrary boundaries. Parallel OpenMP implementation commented out - some is correct, but some is on inner loops, which can't be done if the outer loops are already parallel.	**C**
Performance		**B**
Sustainability	Testing includes runtime checks. Watch your test coverage. Reasonable Github state. HTML documentation.	**B**
Presentation		
	Your peak tracking method worked well and you had some good qualitative analysis of the wave. The next step would be to calculate the wave velocity, including a comparison between different resolutions, and to compare this to the analytical solution. In general, the standard of presentation for the theory and numerical implementation of sloping and arbitrary boundaries was high across the class, however the user interfaces to specify them and versatility of specification was more variable. A theoretical ideal implementation would allow specifying arbitrary and curved boundaries, storing the curves, or their discretization/meshing for use in the relevant "distance to boundary" calculations for additional forces/boundary penetration checks. The groups approached the user-interface aspect of the project in a number of different ways, some relatively simple yet fit for purpose, while others were more enthusiastic and came up with more robust and user-friendly interfaces. There were good discussions during the evaluation around the ways of providing input conditions (e.g. what wold be needed for a parallelised version of the code) and post-processing. Most groups did a reasonable job of establishing numerical convergence. A good approach was to examine the convergence with particle spacing of a well-defined and relevant diagnostic, such as the wave phase velocity or the time for the crest to	**C**

	transit the domain. This required a robust measurement of the wave crest position, which was best done from a smoothed approximation of the free surface rather than from individual particles. Convergence analysis should compare a measure of error in this metric against particle spacing on a log-log plot. A good error metric was the difference in wave speed between the simulation at a given resolution and the speed of the wave in the highest resolution simulation possible. Comparison against the theoretical shallow water wave speed was also possible, but this is only applicable for low amplitude, long wavelength waves. The slope of the plot indicates the order of convergence; a convergence rate ~1 was expected for forward euler; a rate between 1 and 2 was expected for the predictor-corrector method, given the effects of boundary conditions, reaveraging, etc. Faster than expected convergence is typically a sign that the error metric was not robust or the spatial resolution was not high enough.	
PROJECT TOTAL		**C**