1135-65-1083 **M. Aggul**, **J. Connors**, **D. Erkmen** and **A. Labovsky*** (aelabovs@mtu.edu). *High Accuracy Partitioned Method for Fluid-Fluid Interaction.*

A method is proposed to improve two aspects of numerical simulations for a model of two fluids coupled across a flat interface. This problem is motivated by atmosphere-ocean interaction. Currently, there is a need for a higher accuracy method that would allow for the usage of pre-existing atmosphere and ocean solvers. We propose to lift the numerical order of accuracy formally from first order (very common in applications) to second order, by using the deferred correction approach. The method is based on a stable partitioned scheme. Also, the defect correction is added, to represent artificial diffusion used in the fluid solvers, which is often included to control numerical noise or to model subscale mixing processes. The addition of the defect correction adds only marginally to the expense, but in exchange may provide a significant reduction of overdiffusive effects. As a result, we obtain a stable, second order accurate, partitioned method, which allows to use the legacy atmosphere and ocean codes as-is. A computational example using a known (manufactured) solution illustrates the theoretical predictions of the improved convergence rates. We observe a computational benefit in this example even for coarse time steps and over a wide range of artificial viscosity values. (Received September 19, 2017)