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# GPU-accelerated entropy stable discontinuous Galerkin for the shallow water equations with wetting and drying

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We present an entropy stable high order nodal discontinuous Galerkin spectral element approximation for the non-linear two dimensional shallow water equations. The method includes a shock capturing technique and wetting and drying capabilities. The scheme preserves the entropy inequality, is well-balanced and works on unstructured curved quadrilateral meshes. As a shock capturing mechanism, we introduce an artificial viscosity to the equations and prove that the numerical scheme remains entropy stable. We use a positivity preserving limiter to guarantee non- negative water heights as long as the mean water height is non-negative. We prove that non- negative mean water heights are guaranteed under a special CFL condition for the entropy stable numerical interface flux. The method is implemented on GPU architectures using the abstract language OCCA, a unified approach to multi-threading languages. We show that the presented method is well suited to GPUs as the necessary extra calculations do not negatively impact the runtime up to reasonably high polynomial degrees of N=7.

## REFERENCES

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