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# HYBRID FINITE-VOLUME/DISCONTINUOUS GALERKIN FRAMEWORK FOR THE SOLUTION OF MULTIPHYSICS PROBLEMS USING UNSTRUCTURED MESHES

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A hybrid FV/DG framework is developed for the simulation of compressible multi-species flows on unstructured meshes with a five-equation Diffuse-Interface Model [1]. The high order DG method is employed for the purpose of limiting the material interface smearing typical of the diffuse-interface models resulting from excessive numerical dissipation [3, 4].

In order to ensure high-order accuracy in smooth flow regions and non-oscillatory behaviour near shocks or material interfaces, the hybrid scheme resorts to the underlying FV method when invalid cells are detected by a troubled cell indicator checking the unlimited DG, and enables a high-order non-linear CWENOZ reconstruction [8, 6] if the solution present oscillations. The CWENO and CWENOZ type reconstruction uses a high-order polynomial for the central stencil and a lower-order polynomial for the directional stencils enhancing robustness and efficiency of classic WENO schemes.

To achieve consistency in advecting material interfaces at constant pressure and velocity, the source term from the non-conservative equation is discretised compatibly with the Riemann solver, following the work of Johnsen and Colonius [9]. The results presented are obtained with the `UCNS3D` open-source CFD code [5, 6, 7].

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