AREPO White Dwarf merger simulations resulting in edge-lit detonation and run-away hypervelocity companion

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We present a series of simulations generated with the moving-mesh code AREPO to model the merger of two White Dwarf (WD) stars. The primary is a carbon-oxygen (CO) WD with a mass of 1.1 $M_\odot$and the secondary is a helium (He) WD with a mass of 0.35 $M_\odot$. We have found that such a merger resulted in an edge-lit detonation. Helium burning begins at the base of the primary's helium layer after a period of sustained mass deposition while the Carbon detonation occurs 0.2-0.3 seconds later below the helium detonation layer. The variable composition WD structure was produced using the White Dwarf Evolution Code (WDEC), which generates 1D structures from a set of inputs that includes total mass and effective temperature. This represents an improvement on various prior works which are limited to isothermal, constant composition structures. The time evolution of the merger and associated nuclear reactions are computed by AREPO, which has the ability to evaluate the equations of Ideal MHD using a Finite Volume Method (FVM) on a large, unstructured grid.