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	authors	<ul style="list-style-type: none">Hector OlivaresOliver PorthYosuke Mizuno	authors	<ul style="list-style-type: none">Hector OlivaresOliver PorthYosuke Mizuno		
	title	The Black Hole Accretion Code: adaptive mesh refinement and constrained transport	title	The Black Hole Accretion Code: adaptive mesh refinement and constrained transport		
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	abstract	With the forthcoming VLBI images of Sgr A* and M87, simulations of accretion flows onto black holes acquire a special importance to aid with the interpretation of the observations and to test the predictions of different accretion scenarios, including those coming from alternative theories of gravity. The Black Hole Accretion Code (BHAC) is a new multidimensional general-relativistic magnetohydrondynamics (GRMHD) module for the MPI-AMRVAC framework. It exploits its adaptive mesh refinement techniques (AMR) to solve the equations of ideal magnetohydrodynamics in arbitrary curved spacetimes with a significant speedup and saving in computational cost. In a previous work, this was shown using a Generalized Lagrange Multiplier (GLM) to enforce the solenoidal constraint of the magnetic field. While GLM is fully compatible with MPI-AMRVAC's AMR infrastructure, we found that simulations were sensible to the divergence control technique employed, resulting in an improved behavior for those using Constrained Transport (CT). However, cell-centered CT is incompatible with AMR, and several modifications were required to make AMR compatible with staggered CT. We present here preliminary results of these new additions, which achieved machine precision fulfillment of the solenoidal constraint and a significant speedup in a problem close to the intended scientific application.	abstract	With the forthcoming VLBI images of Sgr A* and M87, simulations of accretion flows onto black holes acquire a special importance to aid with the interpretation of the observations and to test the predictions of different accretion scenarios, including those coming from alternative theories of gravity. The Black Hole Accretion Code (BHAC) is a new multidimensional general-relativistic magnetohydrondynamics (GRMHD) module for the MPI-AMRVAC framework. It exploits its adaptive mesh refinement techniques (AMR) to solve the equations of ideal magnetohydrodynamics in arbitrary curved spacetimes with a significant speedup and saving in computational cost. In a previous work, this was shown using a Generalized Lagrange Multiplier (GLM) to enforce the solenoidal constraint of the magnetic field. While GLM is fully compatible with MPI-AMRVAC's AMR infrastructure, we found that simulations were sensible to the divergence control technique employed, resulting in an improved behavior for those using Constrained Transport (CT). However, cell-centered CT is incompatible with AMR, and several modifications were required to make AMR compatible with staggered CT. We present here preliminary results of these new additions, which achieved machine precision fulfillment of the solenoidal constraint and a significant speedup in a problem close to the intended scientific application.		
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