

# HIMAG

## HyPerComp Incompressible MHD Solver for Arbitrary Geometry

Magnetohydrodynamics or MHD is the dynamics of conducting fluids in an electromagnetic field. The critical aspects of three dimensional MHD flow fields in complex geometries are beyond popular engineering intuition and convenient analysis thus requiring high fidelity numerical tools.

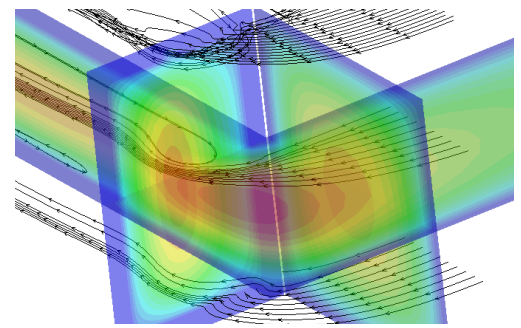
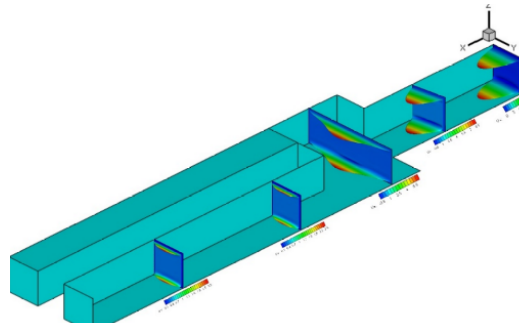
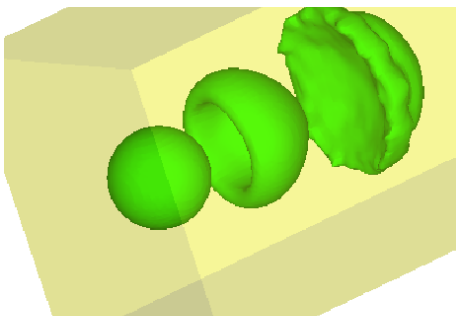
HIMAG is a pioneering complex geometry modeling software, developed by HyPerComp, Inc. to study incompressible flows of this nature. This software package is a simulation environment that can model the flow of liquid metals and other flows occurring in fusion reactors where strong interactions with the magnetic field produce numerous effects that are unique to this brand of flows.

HIMAG is built on a robust iterative implicit solver and is primarily intended for use in PC based clusters running Linux. The code has been used effectively for large problems on thousands of processors.

### FEATURES

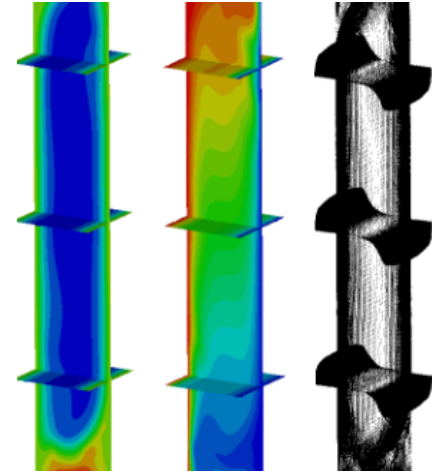
- Parallel 3D incompressible flow solver (second order accurate in space and time)
- Arbitrary mesh structure (hexahedral/tetrahedral/prismatic and hybrid meshes), to resolve interfaces and complex geometry
- Level Set methods for free surface capture
- Implicit methods to ease stiffness and time step constraints
- Electric potential as well as induced magnetic field formulations:  $\phi$  formulation, B-formulation and A- $\phi$  formulation
- Ability to include multiple solid walls of different conductivity and contact resistance
- Modeling of axially periodic flows, fully developed flows and unsteady state flows
- Multiple strategies to account for mesh skewness/non-orthogonality
- Mass transfer, tritium transport and heat transfer, natural convection, temperature dependent properties can be modeled

Please visit us at: [www.hypercomp.net](http://www.hypercomp.net)  
For inquires, reach us at: [HIMAG@hypercomp.net](mailto:HIMAG@hypercomp.net)



## Applications

- Blanket physics modeling
- Natural & mixed convection
- Modeling highly unsteady current-driven liquid metal free-surface MHD flows
- High Hartmann Number flow computations



## HIMAG Software Suite

The HIMAG software suite consists of the MHD solver along with four major graphically driven utilities, which include **XYZ** (for mesh creation), **Prep** (for setting boundary conditions and materials), **PartUx** (partitioning for parallel computing) and **MHD2Tec** (for post-processing).

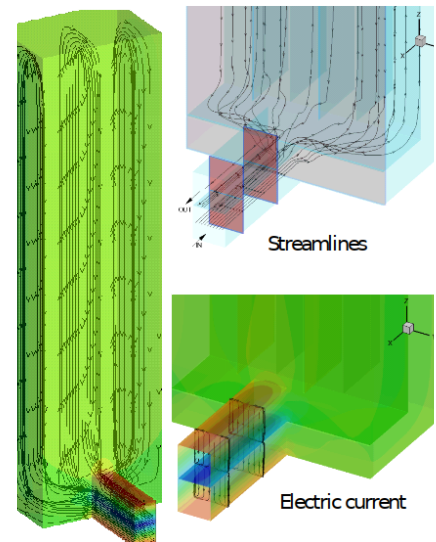
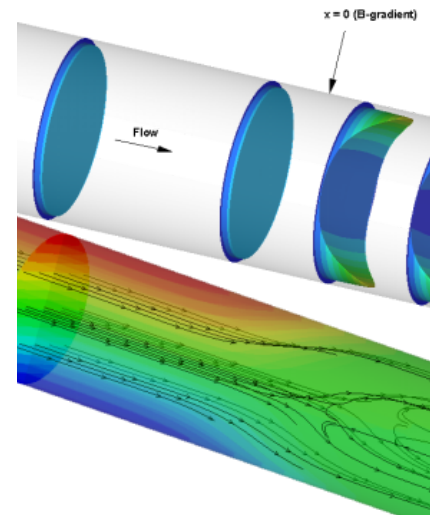
## Consulting and Professional Services

Our team of skilled professionals at HyPerComp provides our customers with expertise in engineering and scientific research. The levels of support we offer range from consulting on best practices for applications of software to full start-to-finish modeling solutions. We develop, validate and disseminate user-friendly, high performance computational technologies combining advances in physics-based numerical algorithms and parallel computing hardware for cost-effective simulations of complex, multidisciplinary physical processes in support of defense and commercial product design.

## Software Availability and Training

We offer a variety of training options customized according to individual needs. We also provide a startup tutorial which covers every aspect of the software, from installation to running simulations. All our training sessions are designed to provide detailed instruction in a highly interactive manner.

**Latest HIMAG version is available for licensing through HyPerComp.**



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