Numerical tools for burning plasma applications

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The software stack under development at the TSVV Task 10 (EUROfusion's E-TASC project) will be presented. The major projects requiring the HPC resources are the global gyrokinetic codes ORB5 and EUTERPE, and the global hybrid-MHD codes HYMAGYC and XTOR. Also applications using the integrated modeling tools, such as the IMAS-based Energetic-Particle Workflow or the SCENIC code package for modelling radio-frequency heating and fast-ion generation may require intensive computation and a substantial memory footprint. The continuous development of these codes both on the physics side and on the HPC side allows us to tackle frontier problems, such as the interaction of turbulence with MHD-type modes in the presence of fast particles. We will describe the basic models employed, discuss the typical computation requirements, and show simulation results for the burning plasma physics applications.