

This work is concerned with the numerical solution of initial-boundary value problems for convection-diffusion partial differential equations. Three methods are studied and compared for this purpose: the combined finite element - finite volume (FE-FV) method, the discontinuous Galerkin finite element (DGFE) method of lines, and the spacetime discontinuous Galerkin method. The combined FE-FV method uses piecewise linear conforming finite elements for the discretization of the diffusion terms and piecewise constant FV approximation of the convective terms. The relation between the FE and FV approximations is determined by the so-called lumping operator. In the DGFE method of lines, the space semidiscretization is carried out by piecewise polynomial functions constructed over a triangular mesh, in general discontinuous on interfaces between neighbouring elements. In the space-time DGFE method, the approximate solution is piecewise polynomial in space as well as in time. We discuss both theoretical and practical aspects of the methods, and present numerical results for each of them. For the DGFE method of lines we derive an a posteriori error estimate.