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Finite Volume Scheme for Anisotropic Diffusion[1] BRAM VAN ES, CWI, Amsterdam, The Netherlands; FOM Institute DIFFER, Nieuwegein, The Netherlands, BARRY KOREN, CWI, Amsterdam, The Netherlands; Eindhoven University of Technology, Eindhoven, The Netherlands, HUGO DE BLANK, FOM Institute DIFFER, Nieuwegein, The Netherlands — In fusion plasmas there is extreme anisotropy of transport coefficients due to the high temperature and large magnetic field strength. This anisotropy puts stringent requirements on the numerical methods used to solve the MHD-equations since any misalignment of the grid with the fieldlines may cause numerical pollution of the perpendicular diffusion by the much larger parallel diffusion coefficient. The common approach of field-aligned coordinates runs into problems in case of x-point magnetic topology which makes local non-alignment unavoidable. The mimetic finite difference schemes and finite element schemes using the support operator method maintain the accuracy of the perpendicular diffusion particularly well on non-aligned grids. We address why these schemes maintain the accuracy so well. For this purpose we compared several finite-difference schemes and a special finite-volume scheme applied to the anisotropic heat conduction equation.

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