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Two-level method for anisotropic diffusion equations on non-aligned grids

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we consider the linear systems arising from the standard conforming linear finite element discretization of the second order elliptic equations with anisotropic diffusion. Our analysis applies to both cases: (a) grids aligned with the anisotropy; and (b) grids non-aligned with the anisotropy. Applying the standard two-level method to the finite element equations, we show the error propagation operator corresponding to the two-level iteration with block smoother, with suitably chosen blocks, is a uniform contraction in the energy norm. We also provide numerical experiments which validate and confirm the theoretical results.