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On the solvability conditions for the diffusion equation with convection terms

Linear second order elliptic equation describing heat or mass diffusion and convection on a given velocity field is considered in $\mathbb{R}^3$. The corresponding operator L may not satisfy the Fredholm property. In this case, solvability conditions for the equation $Lu = f$ are not known. In this work, we derive solvability conditions in $H^2(\mathbb{R}^3)$ for the non self-adjoint problem by relating it to a self-adjoint Schrödinger type operator, for which solvability conditions are obtained in our previous work.