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A new look at the KLMN theorem

The Kato-Lions-Lax-Milgram-Nelson (KLMN) theorem plays a central role in the theory of operators and the PDEs. When applied to the (formal) Kolmogorov operator $-\Delta + b \cdot \nabla$, the KLMN theorem allows to construct its realization in L^2 as the generator of a holomorphic semigroup. We will demonstrate a new approach to the L^2 theory of $-\Delta + b \cdot \nabla$, using the old ideas of Hille, Lions and Trotter. Compared to the KLMN theorem, this approach admits a considerably wider class of vector fields b while providing a greater regularity of solutions to the corresponding elliptic equation. Joint with Yu.A.Semenov (Toronto).