



## Bi-Kolmogorov type operators and weighted Rellich’s inequalities

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ABSTRACT. In this paper we consider the symmetric Kolmogorov operator  $L = \Delta + \frac{\nabla \mu}{\mu} \cdot \nabla$  on  $L^2(\mathbb{R}^N, d\mu)$ , where  $\mu$  is the density of a probability measure on  $\mathbb{R}^N$ . Under general conditions on  $\mu$  we prove first weighted Rellich’s inequalities and deduce that the operators  $L$  and  $-L^2$  with domain  $H^2(\mathbb{R}^N, d\mu)$  and  $H^4(\mathbb{R}^N, d\mu)$  respectively, generate analytic semigroups of contractions on  $L^2(\mathbb{R}^N, d\mu)$ . We observe that  $d\mu$  is the unique invariant measure for the semigroup generated by  $-L^2$  and as a consequence we describe the asymptotic behaviour of such semigroup and obtain some local positivity properties. As an application we study the bi-Ornstein-Uhlenbeck operator and its semigroup on  $L^2(\mathbb{R}^N, d\mu)$ .

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