A Gaussian Bounds Approach to the Analysis of Diffusion Equations

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Abstract.- Let L be an evolution linear second order differential operator with nonnegative characteristic form. We assume that L has a fundamental solution, smooth out of its poles and bounded from above and from below by Gaussian kernels modeled on a doubling metric. Then we can develop a potential analysis for L including: solvability of the Dirichlet problem, cone-type regularity criteria for the boundary points, Green functions for cylindrical domains, invariant Harnack inequality. Our results apply to a class of non-divergence equations structured on Hörmander vector fields, recently studied in collaboration with Bramanti, Brandolini and Uguzzoni. Our main motivation for these studies is to provide a linear framework for the equations arising in studying motion by Levi-curvature.