

DIRICHLET FORMS FOR SINGULAR DIFFUSION ON GRAPHS

CHRISTIAN SEIFERT AND JÜRGEN VOIGT

Abstract. We describe operators driving the time evolution of singular diffusion on finite graphs whose vertices are allowed to carry masses. The operators are defined by the method of quadratic forms on suitable Hilbert spaces. The model also covers quantum graphs and discrete Laplace operators.

Mathematics subject classification (2010): 47D06, 60J60, 47E05, 35Q99, 05C99.

Keywords and phrases: gap diffusion, quantum graph, Dirichlet form, C_0 -semigroup, positive, submarkovian.

REFERENCES

- [1] F. CHUNG AND L. LU, *Complex graphs and networks*, American Mathematical Society, 2006
- [2] U. KANT, T. KLAUSS, J. VOIGT AND M. WEBER, *Dirichlet forms for singular one-dimensional operators and on graphs*, J. Evol. Equ. **9** (2009), 637–659.
- [3] V. KOSTRYKIN, J. POTTHOFF AND R. SCHRADER, *Contraction semigroups on metric graphs*, In: Analysis on Graphs and its Applications, P. Exner (ed.) et al., Amer. Math. Soc., Providence, RI, Proc. Symp. Pure Math. **77** (2008), 423–458.
- [4] P. KUCHMENT, *Quantum graphs: I. Some basic structures*, Waves Random Media **14** (2004), 107–128.
- [5] P. KUCHMENT, *Quantum graphs: an introduction and a brief survey*, In: Analysis on Graphs and its Applications, P. Exner (ed.) et al., Amer. Math. Soc., Providence, RI, Proc. Symp. Pure Math. **77** (2008), 291–314.
- [6] E. M. OUHABAZ, *Analysis of heat equations on domains*, Princeton University Press, Princeton, 2005.
- [7] C. SEIFERT, *Behandlung singulärer Diffusion mit Hilfe von Dirichletformen*, Diploma Thesis, 2009. <http://www-user.tu-chemnitz.de/~seifch/Forschung/Diplomarbeit.pdf>
- [8] H. VOGT AND J. VOIGT, *Wentzell boundary conditions on the context of Dirichlet forms*, Adv. Differ. Equ. **8**, 7 (2003), 821–842.