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Wellposedness, control, and observability theories for partial differential equations

On Generalized Diffusion Phenomenon

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Abstract: In this talk I will focus on results that connect the asymptotic behavior of solutions to dissipative wave equations to solutions of the corresponding diffusion equations, more precisely, show that the abstract diffusion phenomenon takes place. The systems involve two non-commuting self-adjoint operators in a Hilbert space. When the diffusion semigroup has the Markov property and satisfies a Nash-type inequality, we obtain precise estimates for the consecutive diffusion approximations and remainder. Also, I will present some applications including sharp decay estimates for dissipative hyperbolic equations with variable coefficients on an exterior domain. In the nonlocal case we obtain the first decay estimates for nonlocal wave equations with damping terms; the decay rates are sharp.