

27th IFIP TC7 Conference 2015 on System Modelling and Optimization

New Results for Quantum Control Problems

Recent advances in the control of spin systems

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Abstract: In this talk, I will present some recent results about the optimal control of spin systems in Nuclear Magnetic Resonance and Magnetic Resonance Imaging. This work has been done in collaboration with the group of S. J. Glaser in Munich. A geometric analysis is performed to investigate simple systems. We will discuss in particular the optimization of the signal to noise ratio of a spin $1/2$ particle. A numerical approach based on the GRAPE algorithm is used to solve control problems with an ensemble of spins. In this case, we will show how a robust control field can be designed efficiently.