Inverse Source Problems in Fractional Dual-Phase-Lag heat conduction

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Non-classical thermal models based on a non-Fourier type law have attracted a lot of interest in the past few decades. In this talk, I will discuss the fractional dual-phase-lag heat equation and the uniqueness of a solution to an associated inverse source problem. The constitutive relation

$$\left(1+\tau_q^{\alpha}\mathsf{D}_t^{\alpha}\right)\mathbf{q}(\mathbf{x},t) = -\mathbf{k}(\mathbf{x})\left(1+\tau_T^{\beta}\mathsf{D}_t^{\beta}\right)\nabla T(\mathbf{x},t), \quad 0<\alpha,\beta<1$$

will replace the classical Fourier law. It allows for two phase-lag parameters and involves fractional derivatives of the heat flux $\mathbf{q}$ and the temperature gradient ∇T. First, an introduction to the modeling part and fractional calculus will be given. Next, I will state and discuss our main uniqueness results of determining a space dependent source given the final time observation. Finally, a possible relaxation of the assumptions will be investigated in two modified models.