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MS 5: Non-convex optimisation in the imaging sciences

A primal-dual extragradient method for nonlinear operators in function spaces

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Abstract:
This talk is concerned with the extension of the Chambolle–Pock primal-dual algorithm to nonsmooth optimization problems involving nonlinear operators between function spaces. The proof of local convergence rests on verifying the Aubin property of the inverse of a monotone operator at the minimizer, which is difficult as it involves infinite-dimensional set-valued analysis. However, for nonsmooth functionals that are defined pointwise – such as L^1 or L^∞ norms – it is possible to apply simpler tools from the finite-dimensional theory, which allows deriving explicit conditions for the convergence. This is illustrated for the example of imaging problems with L^1- and L^∞-fitting terms.

This is joint work with Tuomo Valkonen (Cambridge University).