Compressed Solutions of PDEs

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The focus of this talk is on adaptation of ideas from information science - such as soft-thresholding, sparsity and compressed sensing – to PDEs and physics. For an elliptic PDE coming from optimization of a variational quantity or a parabolic PDE coming from gradient descent, addition of an L1 term to the variational quantity leads to solutions that are spatially sparse; i.e., they have compact support. Applications of this technique include soft-thresholding in multiscale numerical computation, “compressed modes” for density functional theory, and compressed wave packets.