

# A Multilevel Sparse Approximation Approach for Elliptic Partial Differential Equations

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## **Abstract**

In this talk, we present a framework for sparse representation solutions of PDEs using the notion of multilevel dictionaries and Galerkin approach. We use the information in the PDE operator, the right hand side and the problem geometry to design a dictionary combining a union of weighted and extended B-splines and problem specific enrichment functions which gives us a sparse representation of the solution. The PDE is discretized in the Galerkin framework and solved using a recursive frame refinement procedure, that uses so called orthogonal matching pursuit to find a good approximation to the sparse solution on a given refinement level.