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Weighted p-Laplacian Parabolic Equation and Signal Decomposition

We show the existence of solutions for a new kind of weighted p-Laplacian parabolic equation and its applications in signal processing in which a signal is decomposed into four parts. The presence of solutions is proved by the Faedo-Galerkin method. The spectrum and decomposition of a signal are constructed through numerical methods in Matlab. Fractional order p-Laplacian and fractional order derivatives are expressed explicitly in the introduced model, so it is easy to implement in Matlab.