Local Polynomial Approximation

Mathematical Models and Methods for Image Processing

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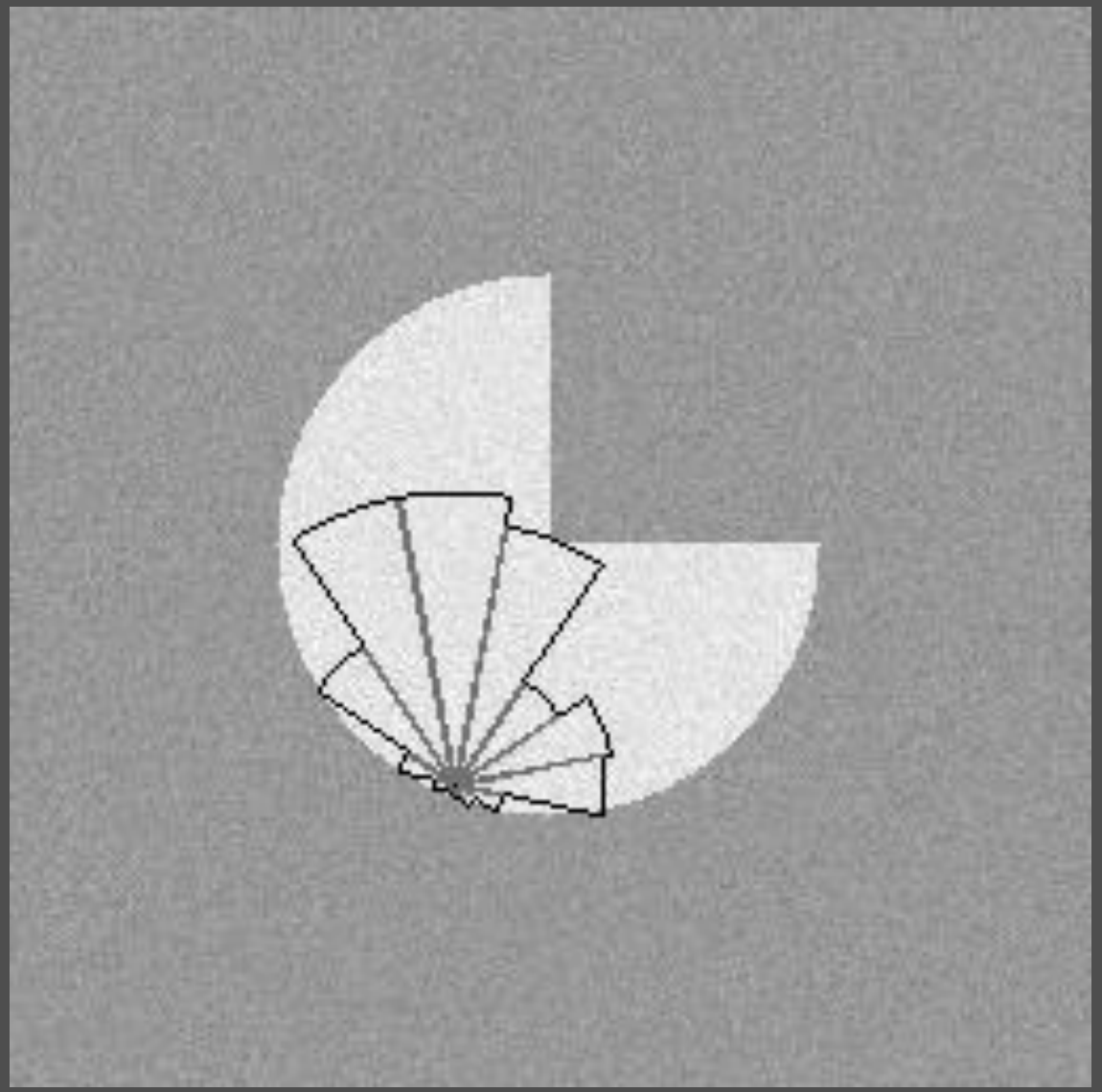
https://webpages.tuni.fi/foi/Present/Anis_Web.html



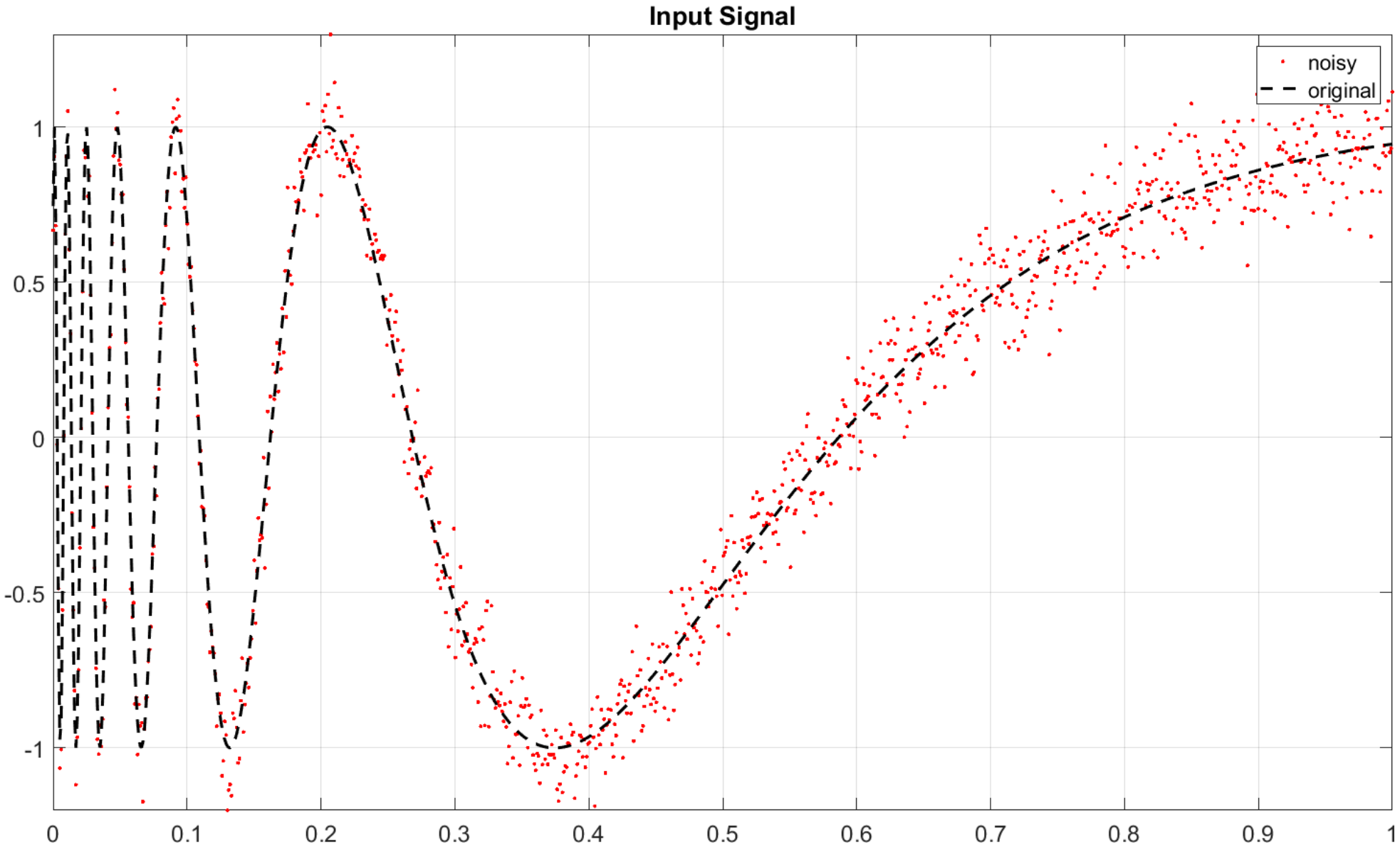
Assignment 1: LPA Kernels

A. Foi, ***Anisotropic nonparametric image processing: theory, algorithms and applications***, Ph.D. Thesis, Dip. di Matematica, Politecnico di Milano, April 2005.

Lez21_A_LPA

Define the LPA filters for a given polynomial order N and over a fixed support M to perform regression over noisy signals

Noisy Signal



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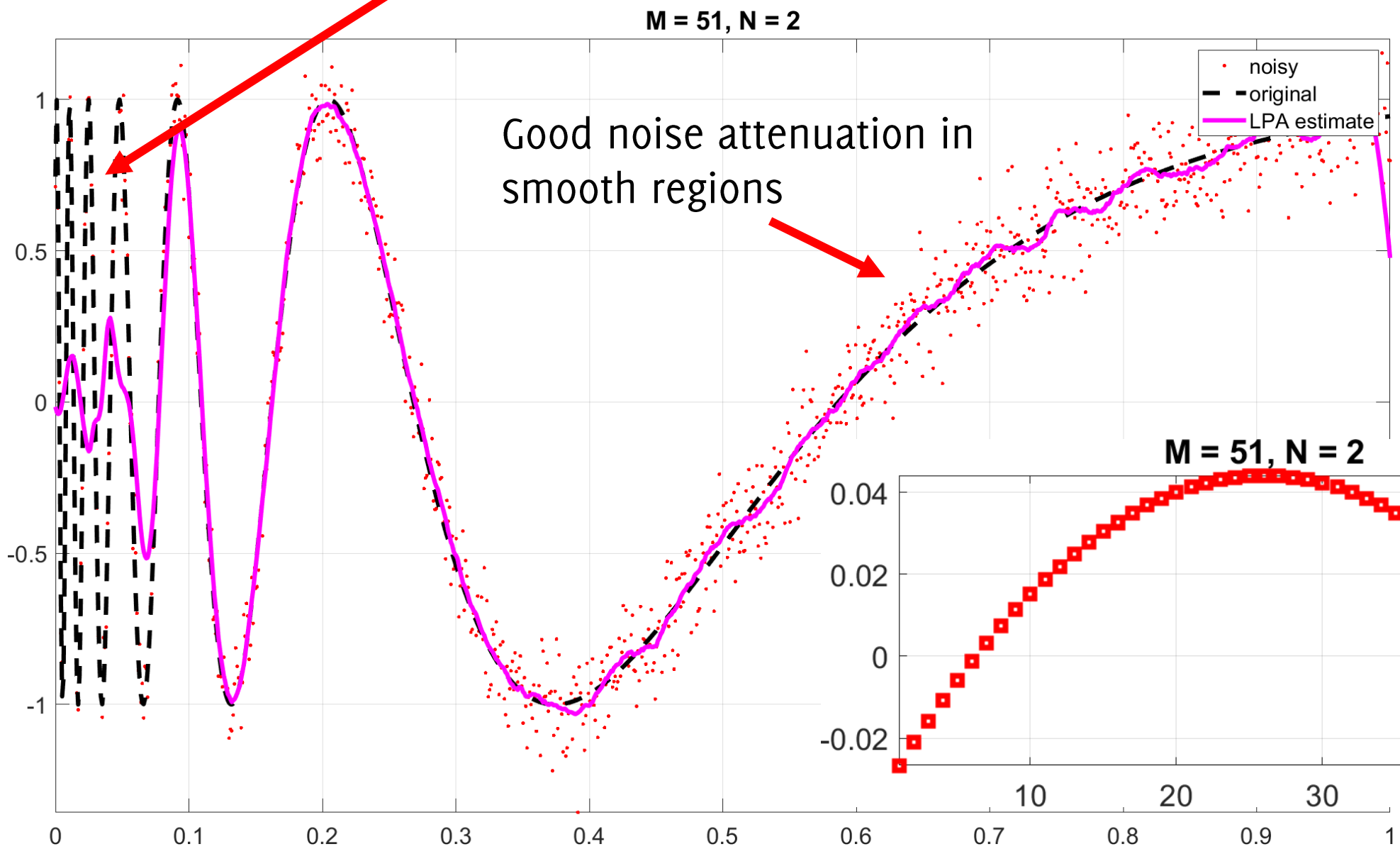
Large M, small N

Biased estimate when the signal frequency is high



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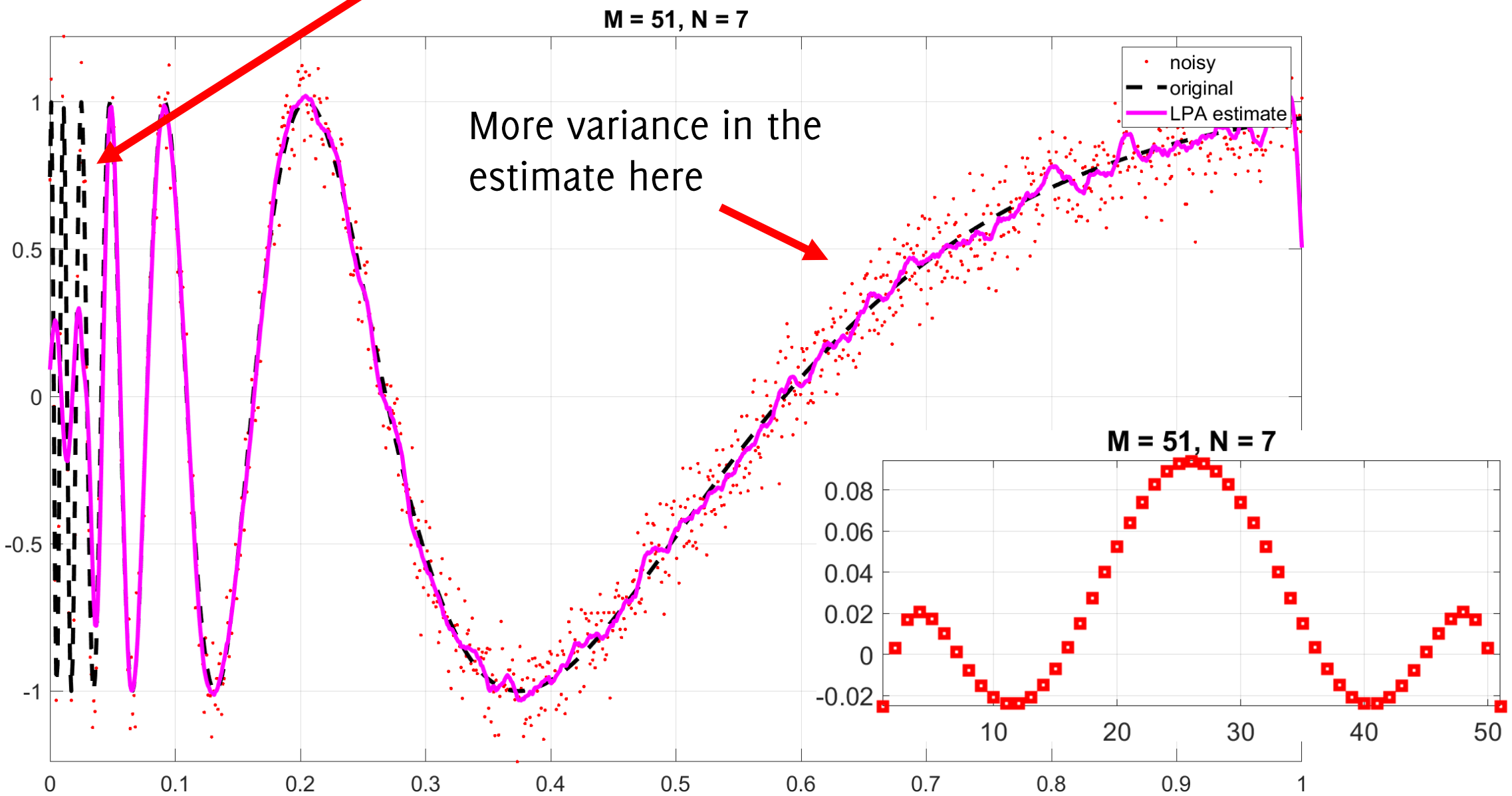
Large M, large N

Lower bias than before when the signal frequency is high



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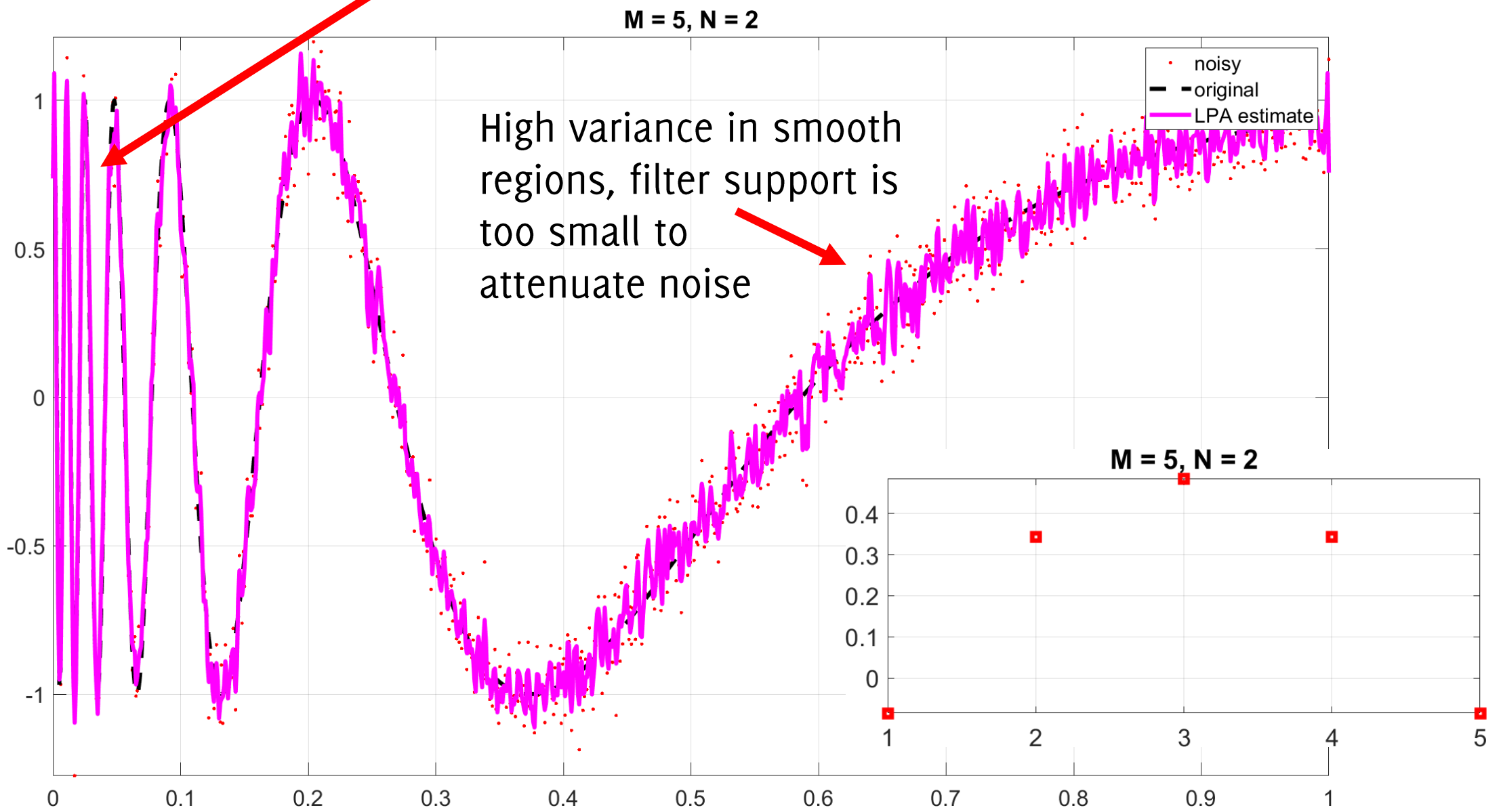
small M, small N

Lower bias than before when the signal frequency is high



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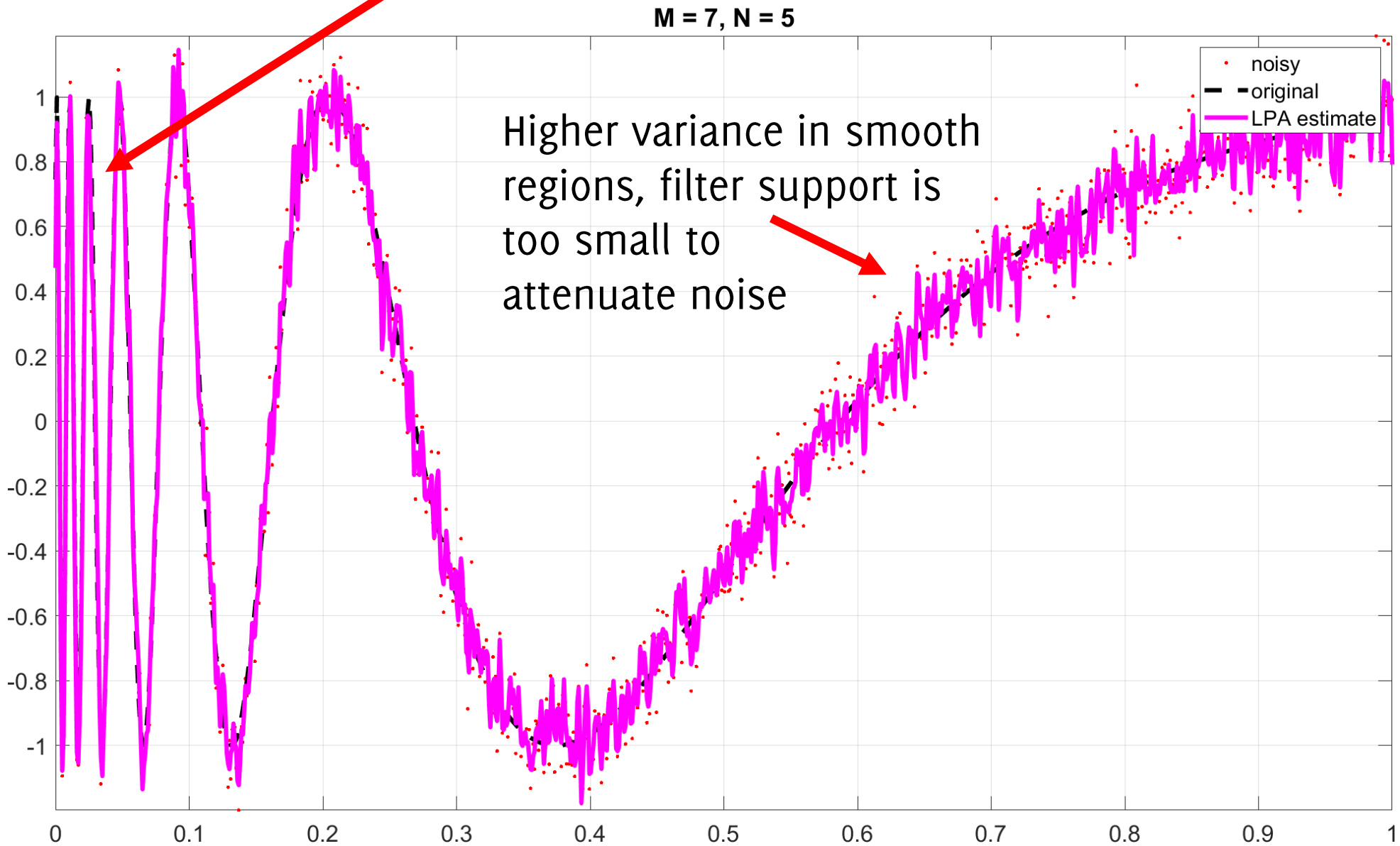
small M, comparable N

Lower bias than before when the signal frequency is high



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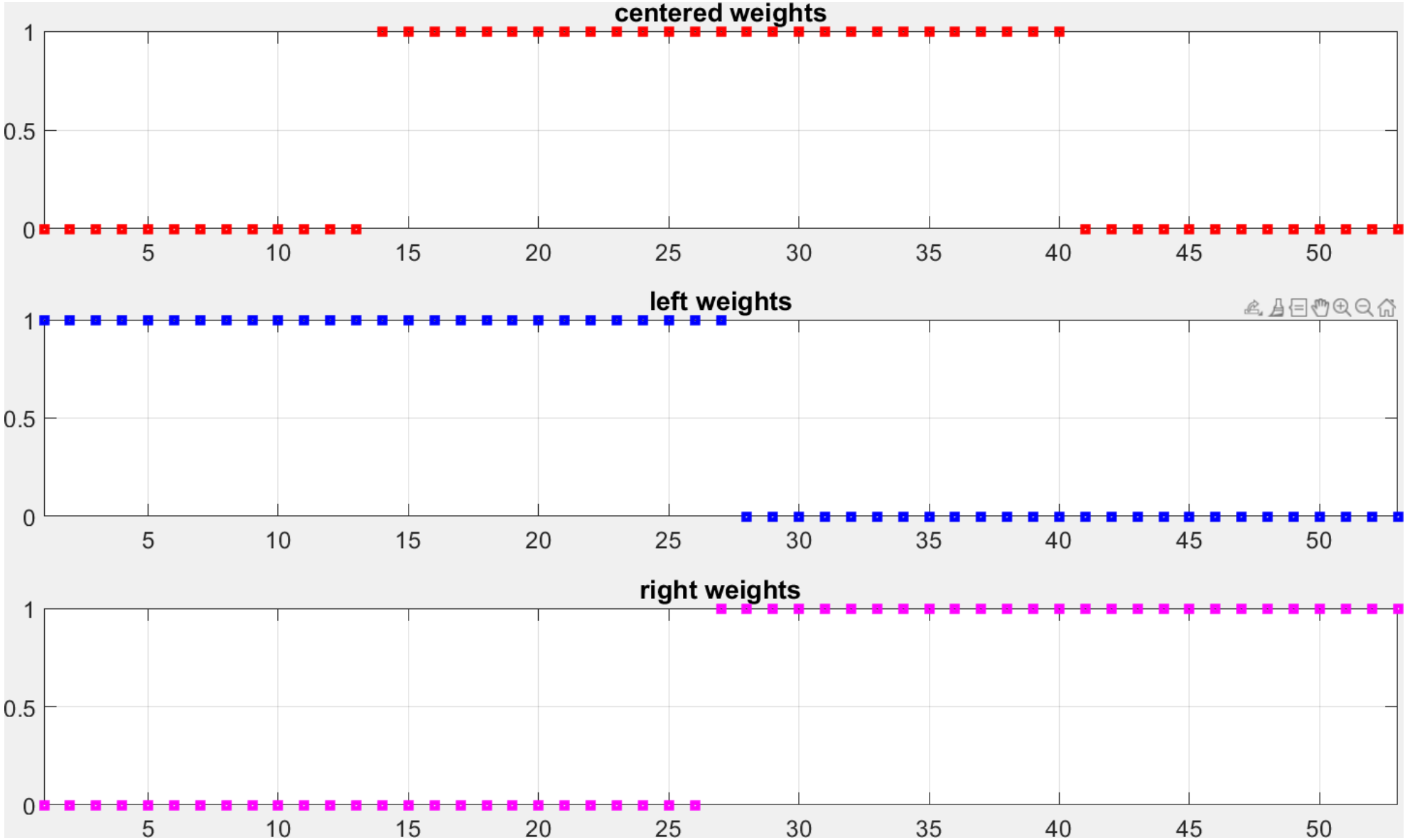
Assignment 2: Weighted LPA Kernels

Lez21_B_weighted_LPA

Define the **weighted LPA** filters for a given polynomial order N and over a fixed support M to perform regression over noisy signals

Use binary weights to compute centered, left and right estimates. See how these behave w.r.t. signal discontinuities

Example of binary weights to use



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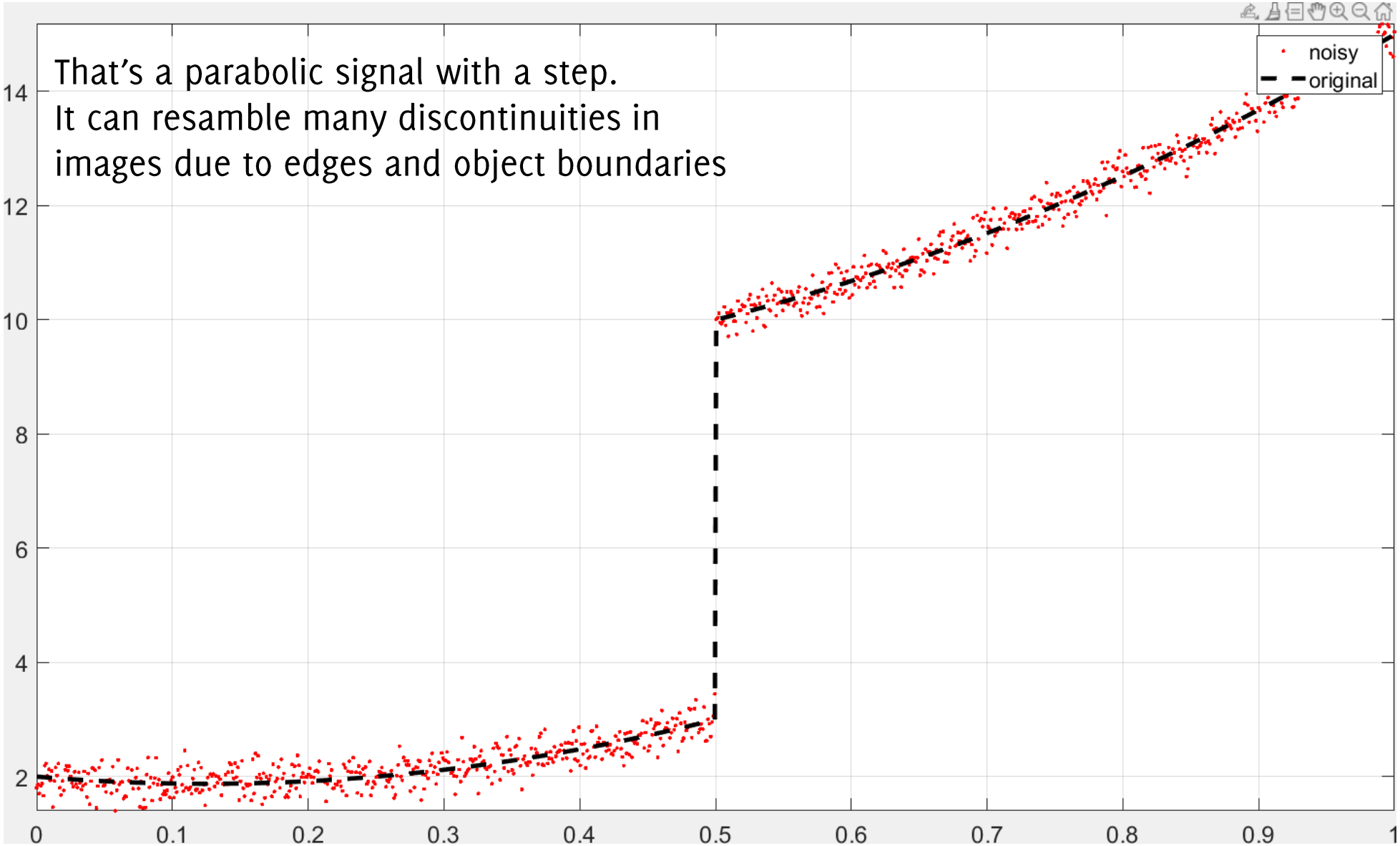
Handling Discontinuities



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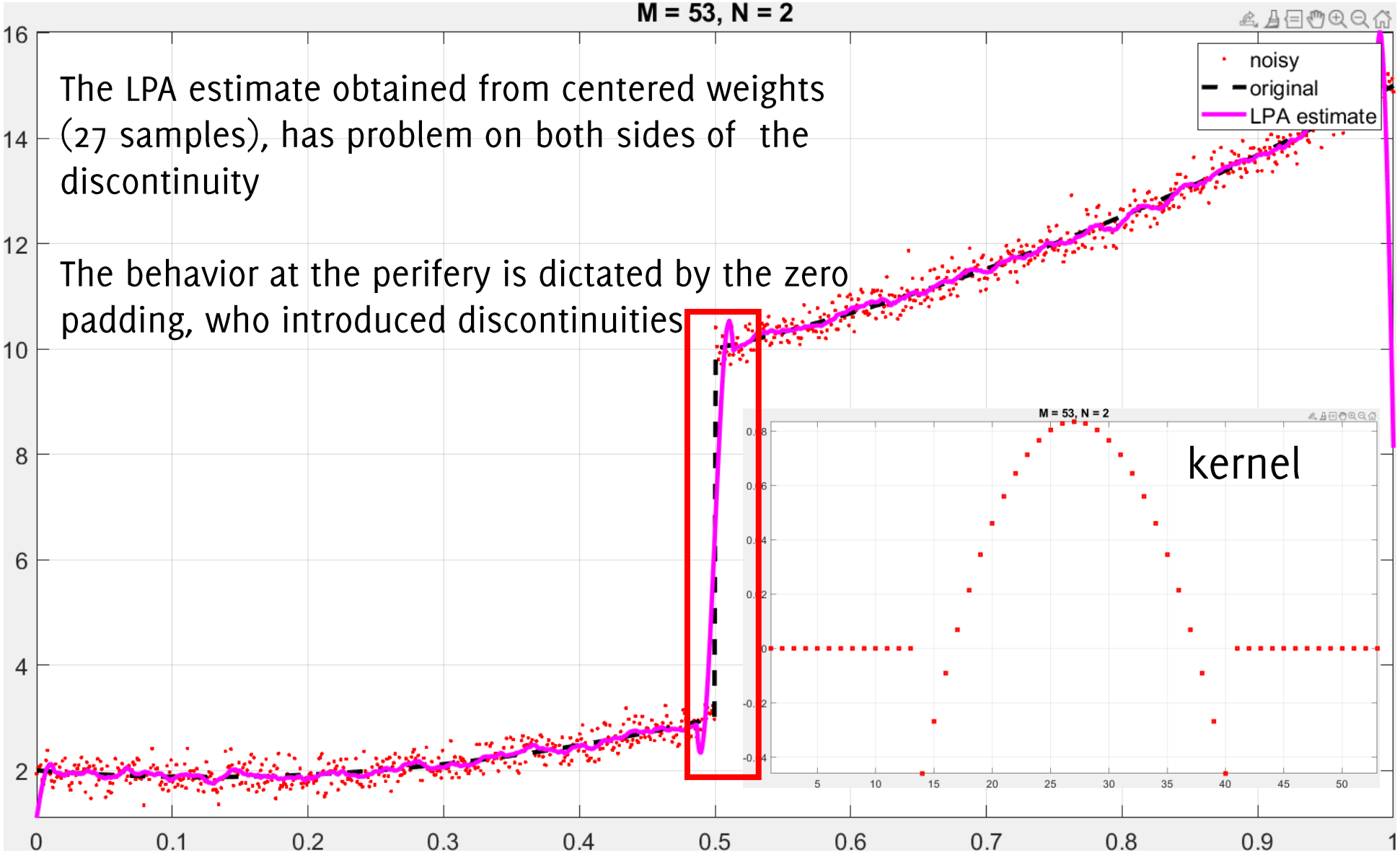
Handling Discontinuities: «centered weights»



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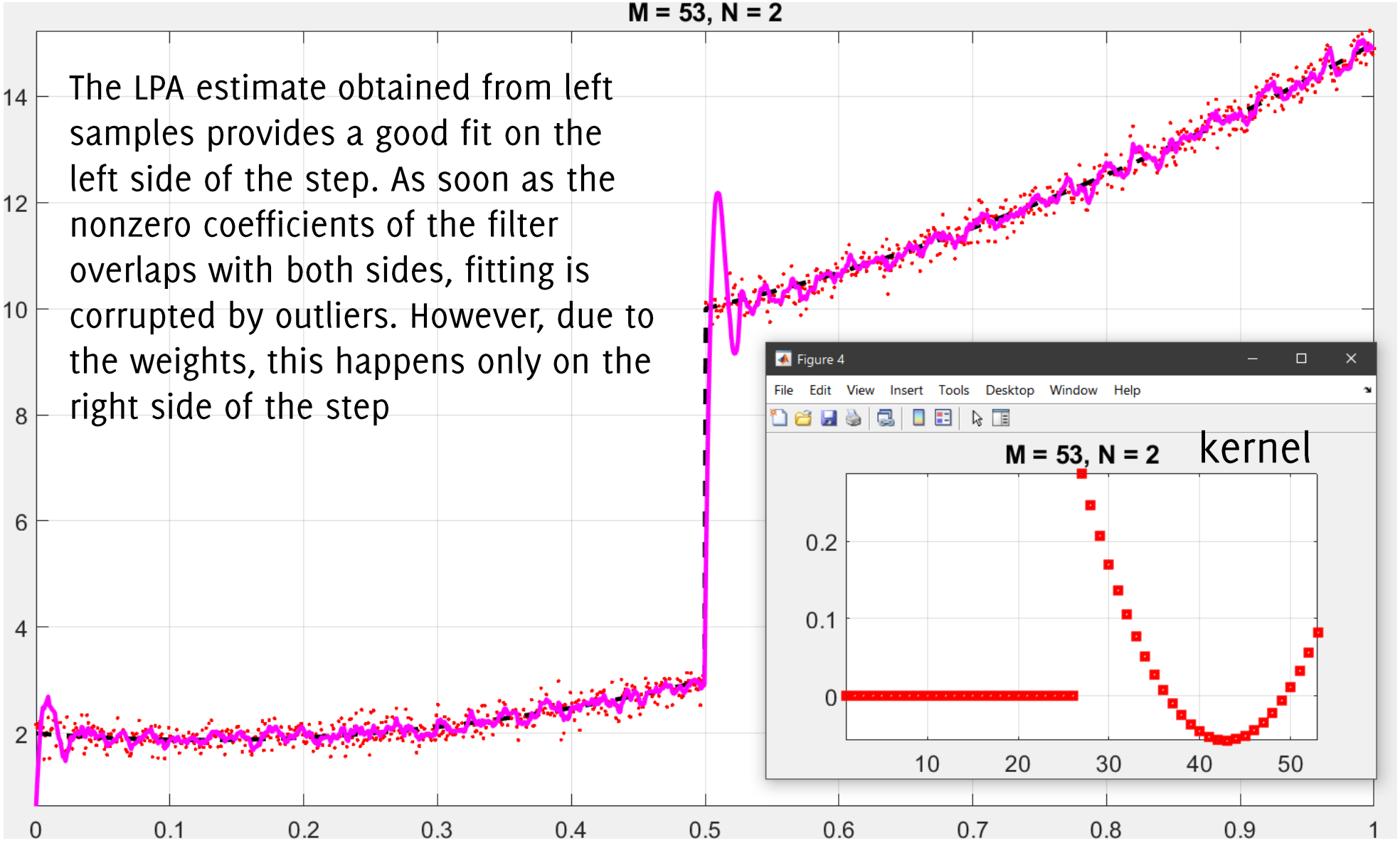
Handling Discontinuities: «left weights»



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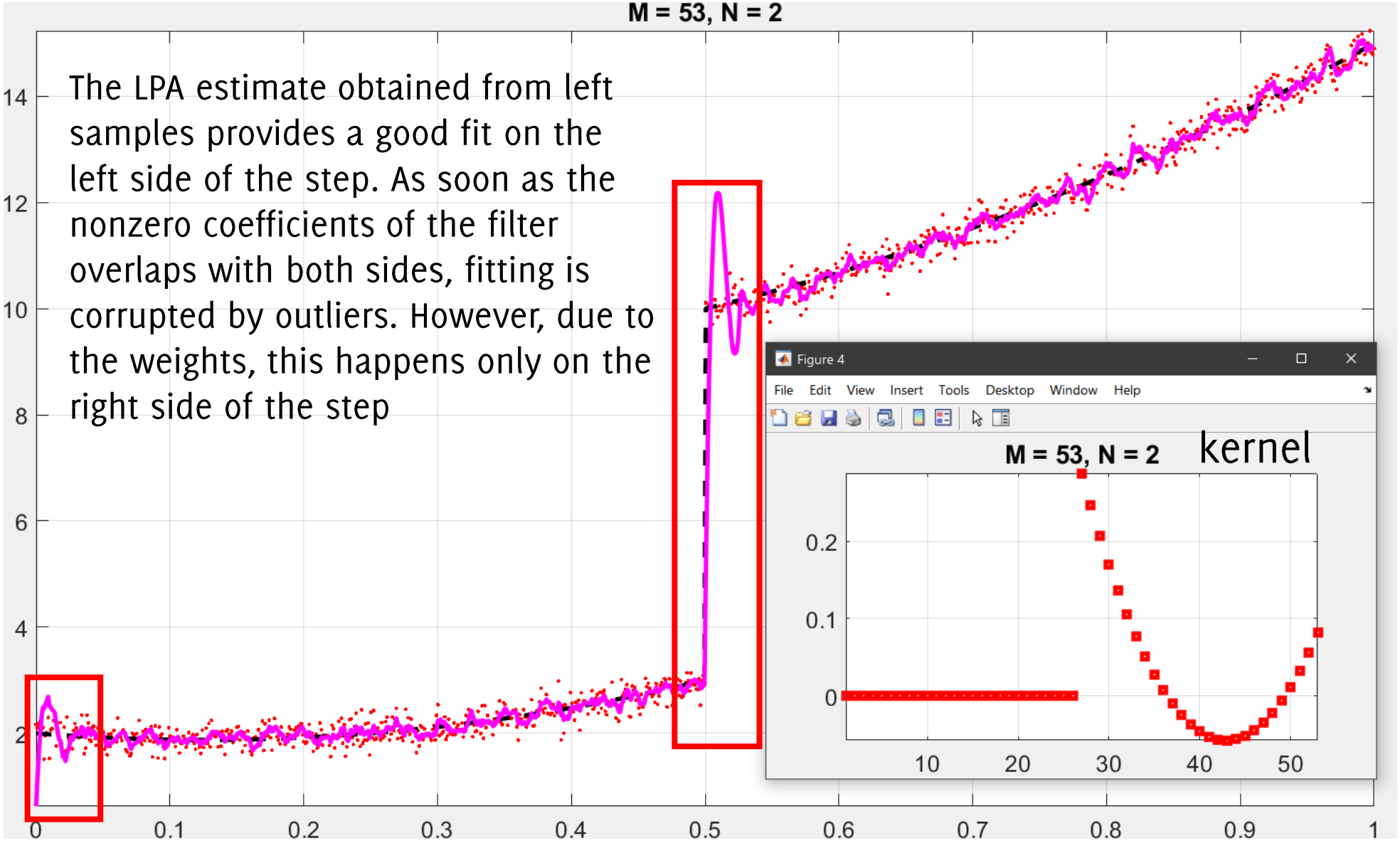
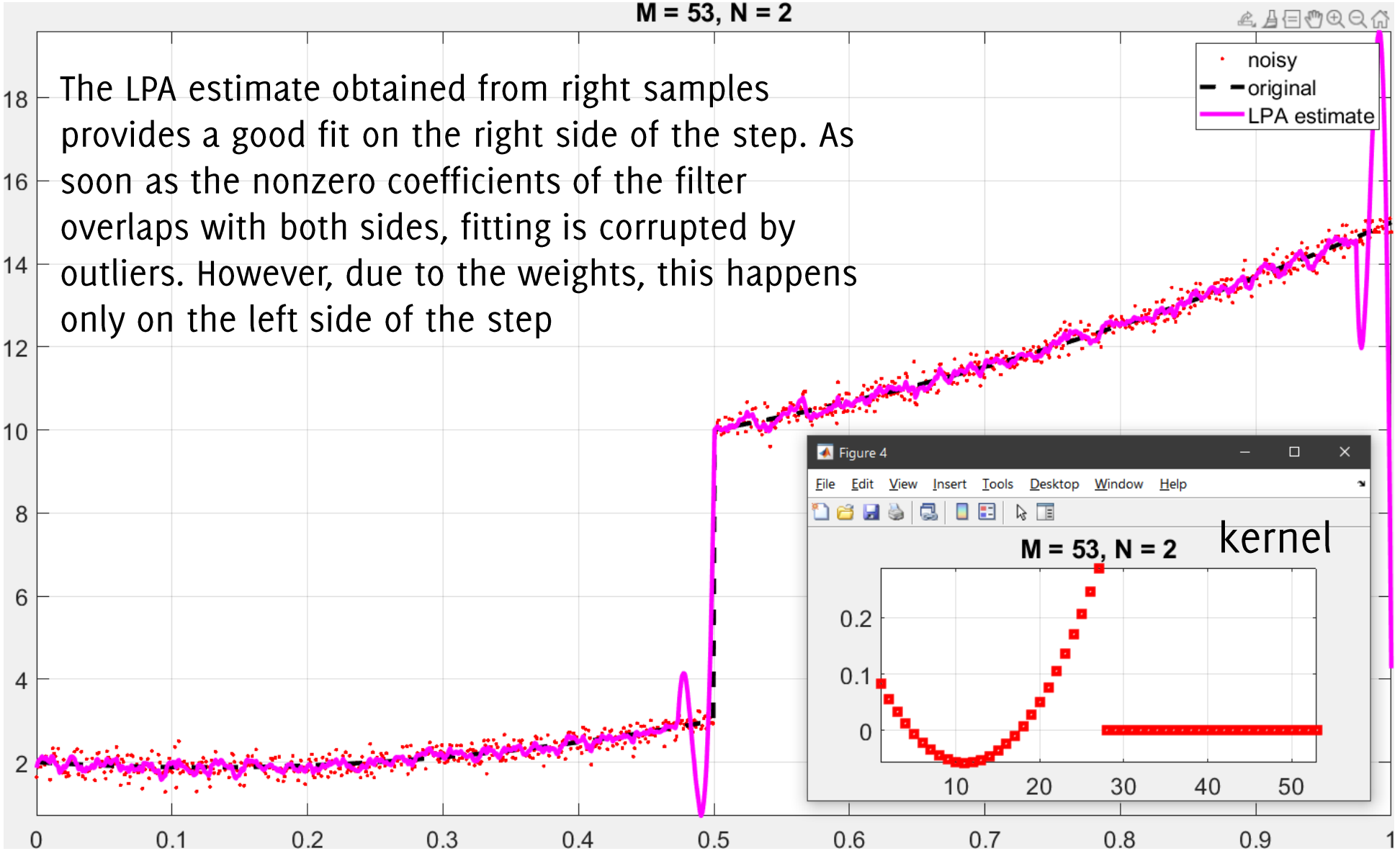
Handling Discontinuities: «left weights»



Handling Discontinuities: «right weights»



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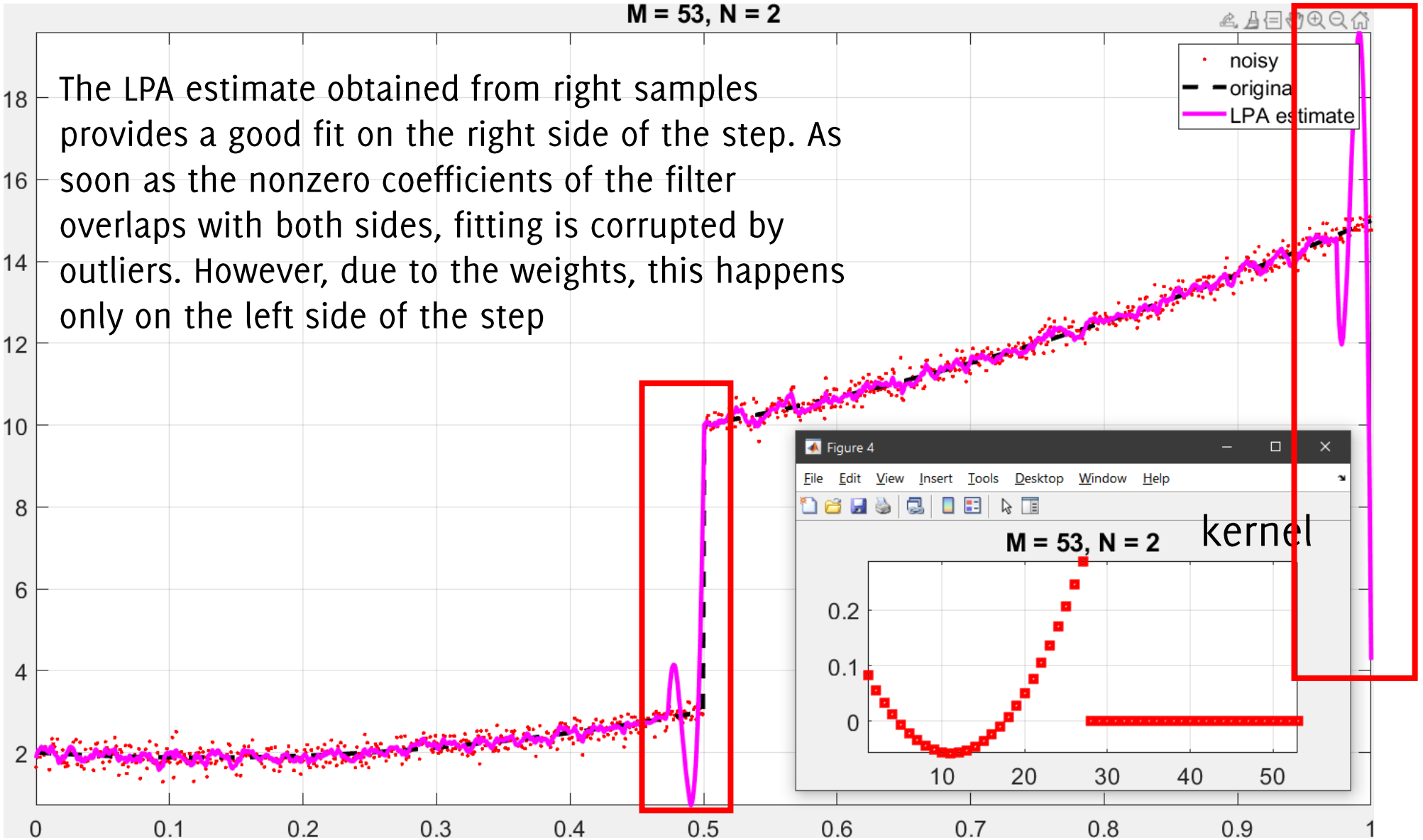
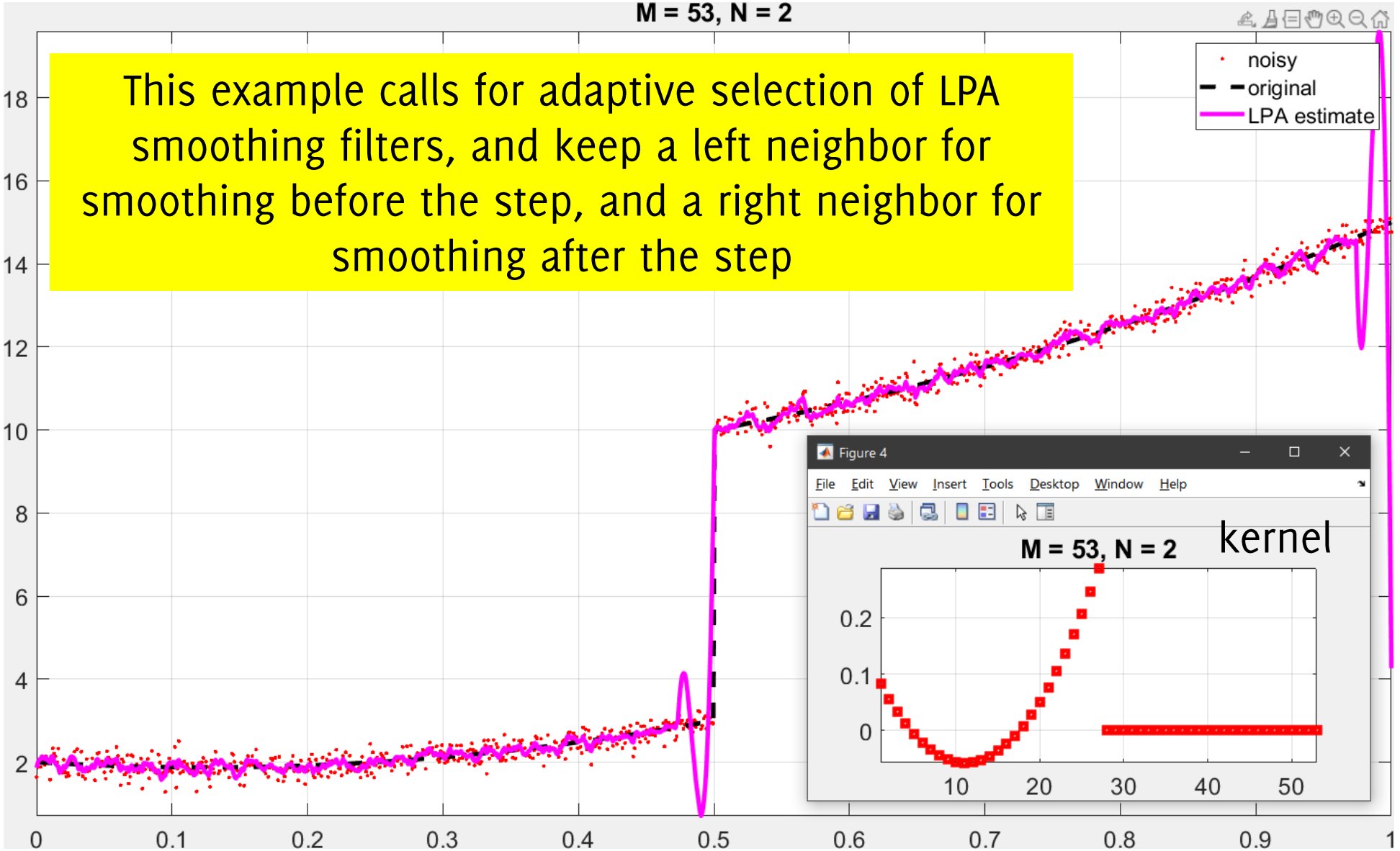
Handling Discontinuities: «right weights»



Handling Discontinuities: «right weights»



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