

SVD jupyter

Import libraries

Start by importing pytorch & matplotlib. I could not make the latex interpreter work in binder, so the corresponding lines are commented out.

Create the functions

The separability proprieties of several functions are investigated. This code first shows the separability proprieties of different ways of clustering the 1D space into two regions. Two types of functions are used to do so: * A sharp step function (Heaviside), * A smooth one (Tanh).

In both cases the position of the jump is parametrised by a scalar parameter α .

Furhter investigations are conducted on moving front(s) with a * A gaussian function that is moving * Two gaussian functions moving at different rates

Plot the reference function

Compute its SVD

Compute the truncated function

From the SVD, only the N first modes are kept to reconstruct the truncated function.

Plot the truncated function

Comparison

The truncated function and its reference are compared for two values $\alpha = 1/3$ & $\alpha = 2/3$.

Show the decay of the singular values

The decay of the singular values gives a good insight into the investigated function's separability properties.

Interactive plot comparing the truncated function and the reference

This interactive plot allows to change the number of modes in the truncation and the value of the parameter α .