Wavelet filter: Wavelet denoising decomposes the signal into multi‑resolution detail and approximation coefficients. By thresholding high‑frequency detail coefficients and reconstructing, it suppresses noise while retaining sharp features better than many global smoothers.

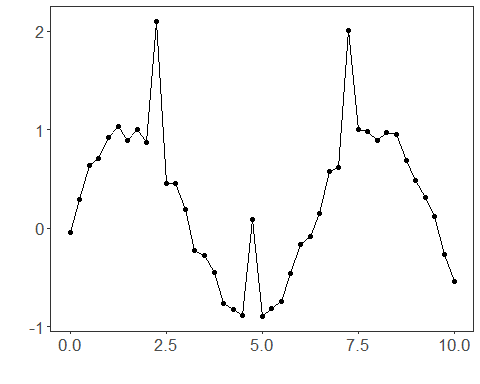
Objective: Apply denoising with discrete wavelets (MODWT), removing high-frequency details to smooth the series.

# Filter - Wavelets  
  
# Installing the package (if needed)  
#install.packages("tspredit")

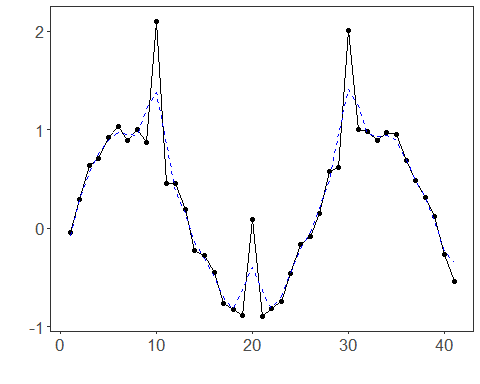
# Loading the packages  
library(daltoolbox)  
library(tspredit)

# Series for study with artificial noise and spikes  
  
data(tsd)  
y <- tsd$y  
noise <- rnorm(length(y), 0, sd(y)/10)  
spike <- rnorm(1, 0, sd(y))  
tsd$y <- tsd$y + noise  
tsd$y[10] <- tsd$y[10] + spike  
tsd$y[20] <- tsd$y[20] + spike  
tsd$y[30] <- tsd$y[30] + spike

library(ggplot2)  
# Noisy series visualization  
plot\_ts(x=tsd$x, y=tsd$y) + theme(text = element\_text(size=16))



# Applying the Wavelet filter  
  
filter <- ts\_fil\_wavelet()  
filter <- fit(filter, tsd$y)  
y <- transform(filter, tsd$y)  
plot\_ts\_pred(y=tsd$y, yadj=y) + theme(text = element\_text(size=16))



References - D. L. Donoho and I. M. Johnstone (1994). Ideal spatial adaptation by wavelet shrinkage. Biometrika, 81(3), 425–455.