REMD filter: REMD adopts robustness enhancements to EMD, such as noise‑assisted ensemble strategies (e.g., EEMD/CEEMDAN), to stabilize the decomposition under noise and reduce mode mixing. After decomposition, high‑frequency IMFs are attenuated and the remaining components are summed to form the denoised signal.

When to use: - Nonlinear/nonstationary series where frequency content changes over time - You want a data-driven decomposition without fixed bases (e.g., unlike wavelets/Fourier)

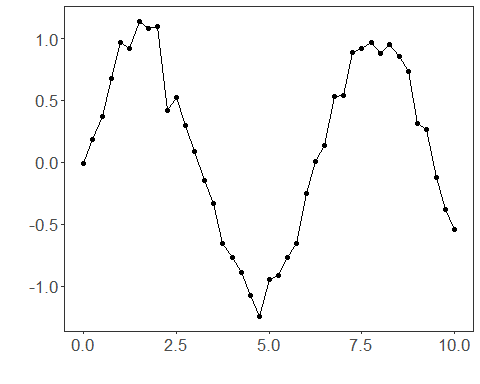
Objectives: Robust Empirical Mode Decomposition (REMD) decomposes a signal into intrinsic mode functions (IMFs) in a way that is less sensitive to noise and outliers than standard EMD. Reconstructing the series from selected IMFs yields a denoised version while preserving nonstationary and nonlinear characteristics.

# Filter - REMD  
  
# Install tspredit if needed  
#install.packages("tspredit")

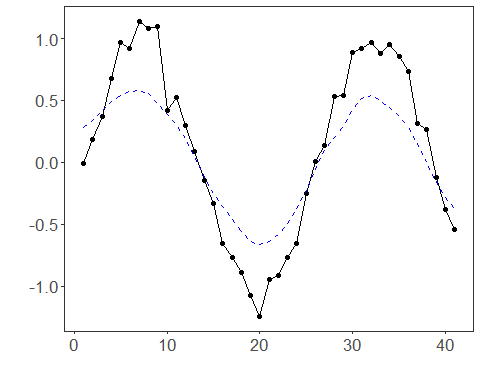
# Load packages  
library(daltoolbox)  
library(tspredit)

# Prepare a noisy series with 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)  
# Visualize the noisy input  
plot\_ts(x=tsd$x, y=tsd$y) + theme(text = element\_text(size=16))



# Apply REMD (robust EMD)  
  
filter <- ts\_fil\_remd() # data-driven decomposition into IMFs (robust)  
filter <- fit(filter, tsd$y)  
y <- transform(filter, tsd$y) # reconstruction after robust decomposition  
  
# Compare original vs denoised  
plot\_ts\_pred(y=tsd$y, yadj=y) + theme(text = element\_text(size=16))



References - Souza, J., et al. REMD: A Novel Hybrid Anomaly Detection Method Based on EMD and ARIMA. IJCNN, 2024. <doi:10.1109/IJCNN60899.2024.10651192>