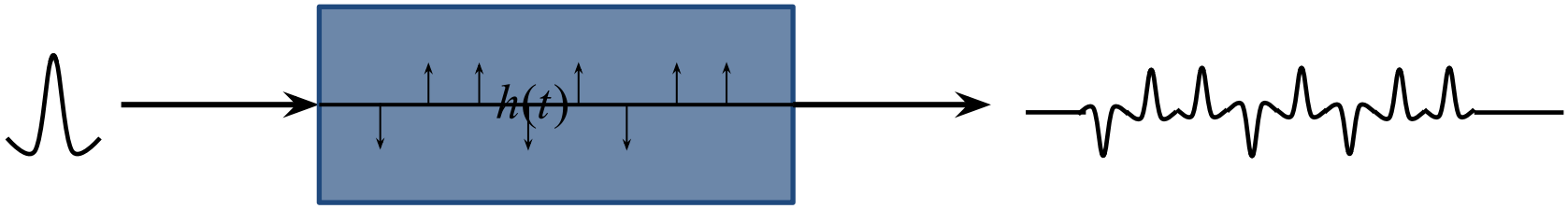
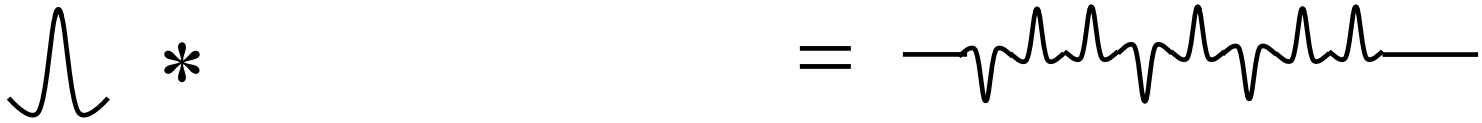
Convolution (Свертка)
(Фильтрация)

Deconvolution (???)
(Деконволюция)
(Обратная фильтрация)

Convolution





Convolution

$$x(t) * h(t) = y(t)$$

$$y(t) = \int_0^t x(\tau) \cdot h(t-\tau) d\tau$$

$$c_k = \sum_{j=0}^{n} a_{k-j} b_j \qquad n = N + M - 1$$

Convolution

$$x(t) * h(t) = y(t)$$

$$X(w) \cdot H(w) = Y(w)$$

Deconvolution

$$y(t) * h^{-1}(t) = x(t)$$

$$Y(w) \cdot H^{-1}(w) = X(w)$$

$$x(t) \overset{F}{\longleftrightarrow} X(w)$$

$$y(t) \overset{F}{\longleftrightarrow} Y(w)$$

$$h(t) \overset{F}{\longleftrightarrow} H(w)$$

$$h^{-1}(t) \overset{F}{\longleftrightarrow} H^{-1}(w)$$

$$H^{-1}(w) \cdot H(w) = 1$$

Convolution -Deconvolution

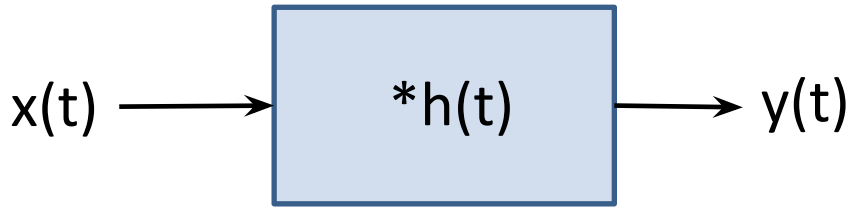
$$x(t) * h(t) = y(t)$$

$$X(w) \cdot H(w) = Y(w)$$

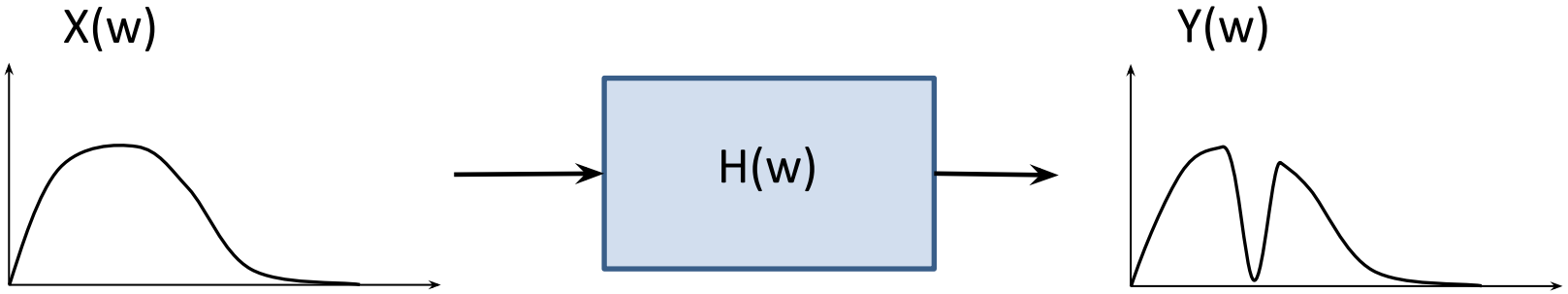
$$H(w) = \frac{Y(w)}{X(w)}$$

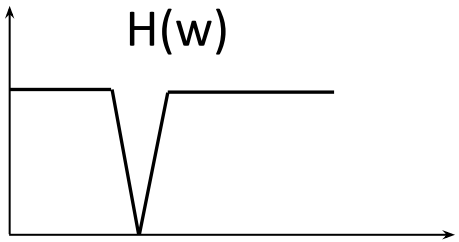
$$H^{-1}(w) = \frac{X(w)}{Y(w)}$$

Convolution –Deconvolution



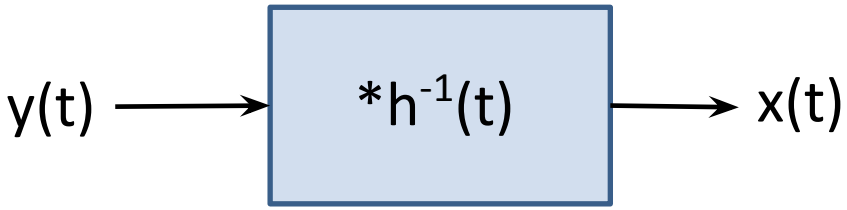
Time domain



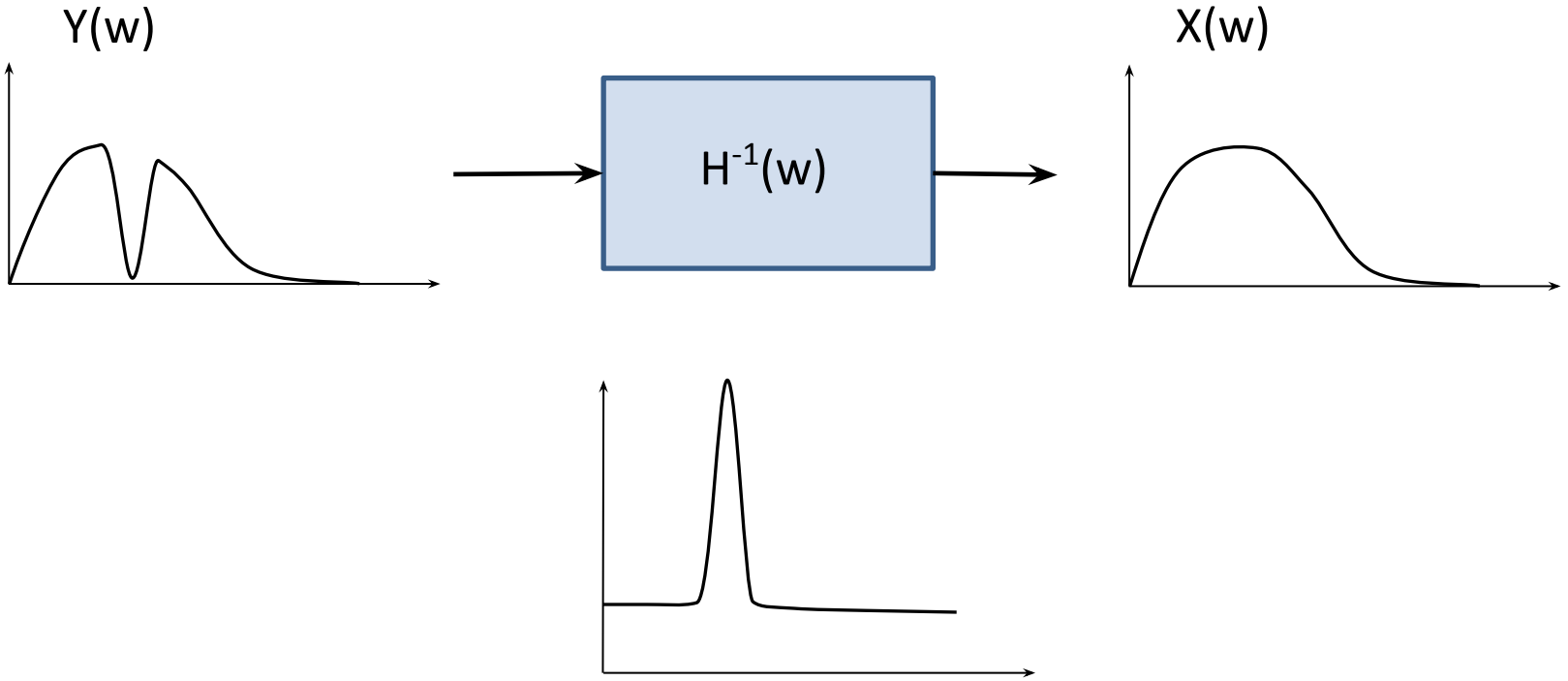


Frequency domain

Convolution –**Deconvolution**



Time domain



Frequency domain

Convolution (Свертка)

$$x(t) * h(t) = y(t)$$

$$X(w) \cdot H(w) = Y(w)$$

Deconvolution

$$y(t) * h^{-1}(t) = x(t)$$

$$Y(w) \cdot H^{-1}(w) = X(w)$$

$$x(t) \overset{F}{\longleftrightarrow} X(w)$$

$$y(t) \overset{F}{\longleftrightarrow} Y(w)$$

$$h(t) \overset{F}{\longleftrightarrow} H(w)$$

$$h^{-1}(t) \overset{F}{\longleftrightarrow} H^{-1}(w)$$

$$H^{-1}(w) \cdot H(w) = 1$$

Метод наименьших квадратов (МНК, Ordinary Least Squares, OLS)

$$L = \sum_{k=0}^{n} [x_k - y_k * f_k]^2 \to \min \qquad f_k \to h_k$$

$$\begin{cases} \dfrac{\partial L}{\partial f_k} = 0 \end{cases}$$

$$y_k = (1; -\frac{1}{2}) \qquad x_k = (1;0;0) \qquad f_k = (f_1; f_2)$$

Задание домой

По трем точка получить уравнение параболы. Парабола выбирается каждым самостоятельно. Решение принести с собой.