$$\texttt{ftophat[s\_, r\_]} := \frac{\texttt{Tanh[s (r + R)] - Tanh[s (r - R)]}}{\texttt{2 Tanh[s R]}}$$

```
R = 1
```

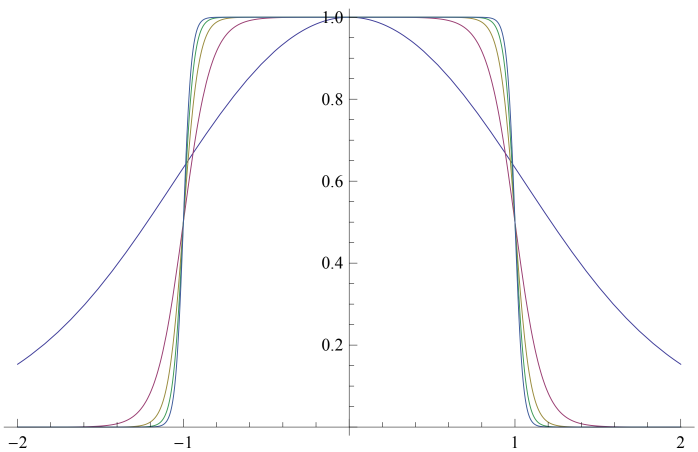
```
1
```

```
σ = 23
```

```
23
```

The following shows the tophat nature of the f function that multiplies the velocity in the β displacement element

```
Plot[Evaluate[Table[ftophat[s, r], {s, 1, 23, 5}]], {r, -2, 2}]
```



$$\texttt{D}\left[\frac{\texttt{Tanh[s (r + R)] - Tanh[s (r - R)]}}{\texttt{2 Tanh[s R]}}, \texttt{r}\right]$$

$$\frac{1}{2}\,\texttt{Coth[s]}\left(-\texttt{s Sech[(-1 + r) s]}^2 + \texttt{s Sech[(1 + r) s]}^2\right)$$

There's got to be a better way to write down this function than what I'm doing here (longhand)

$$\texttt{theta[x\_, rho\_, s\_, xs\_]} = \frac{(\texttt{x - xs})}{\left((\texttt{x - xs})^2 + \texttt{rho}^2\right)^{\frac{1}{2}}}$$

$$\left(\frac{1}{2}\,\texttt{Coth[s]}\left(-\texttt{s Sech}\left[\left(-1 + \left((\texttt{x - xs})^2 + \texttt{rho}^2\right)^{\frac{1}{2}}\right)\texttt{s}\right]^2 + \texttt{s Sech}\left[\left(1 + \left((\texttt{x - xs})^2 + \texttt{rho}^2\right)^{\frac{1}{2}}\right)\texttt{s}\right]^2\right)\right)$$

$$\frac{(\texttt{x - xs})\,\texttt{Coth[s]}\left(-\texttt{s Sech}\left[\texttt{s}\left(-1 + \sqrt{\texttt{rho}^2 + (\texttt{x - xs})^2}\right)\right]^2 + \texttt{s Sech}\left[\texttt{s}\left(1 + \sqrt{\texttt{rho}^2 + (\texttt{x - xs})^2}\right)\right]^2\right)}{2\sqrt{\texttt{rho}^2 + (\texttt{x - xs})^2}}$$

```
Plot3D[theta[x, rho, 8, 27],
 {x, 25.5, 28.5}, {rho, -1.5, 1.5}, PlotRange → {-4, 4}]
```