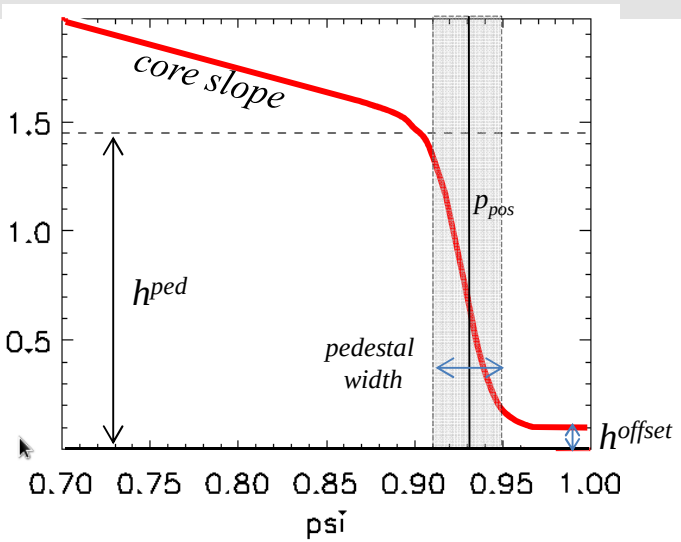
Mtanh and linear fits

Experimental data fitted both with the mtanh and with the linear fit.



***mtanh* definition [Scannell RSI2011]:**

$$mtanh\left([h^{ped}, \mathrm{w}, \mathrm{p_{pos}}, s, h^{offset}], \psi_N\right) = \frac{h^{ped} - h^{offset}}{2}\left(\frac{(1+sx)e^{x} - e^{-x}}{e^{x} + e^{-x}} + 1\right) + h^{offset}$$

$$\text{with} \quad \mathrm{x} = \frac{\mathrm{p_{pos}} - \psi_N}{2\mathrm{w}}$$

Note that the core slope and the pedestal width are related to the five mtanh parameters via:

$pedestal\ width = 4w$ this is the definition of pedestal width in the ITPA DB and in DIII-D, MAST and JET. It corresponds to the width from 12% to 88% of the pedestal height.

$core\ slope = \frac{h^{ped} - h^{offset}}{4w} s$ this corresponds to the derivative of the mtanh in the linear part inside the pedestal (see figure)

- Experimental data will be shifted to have a specific T_e^{sep}. Slide 5 for details on T_e^{sep}.
- Parameters determined in the normalized poloidal flux ψ_N. The equilibrium will be stored, so the parameters can be re-evaluated in other coordinates by the users.
- Fits will be done in the pre-ELM phase (80-99% for Te, a larger time window for Ti in AUG)

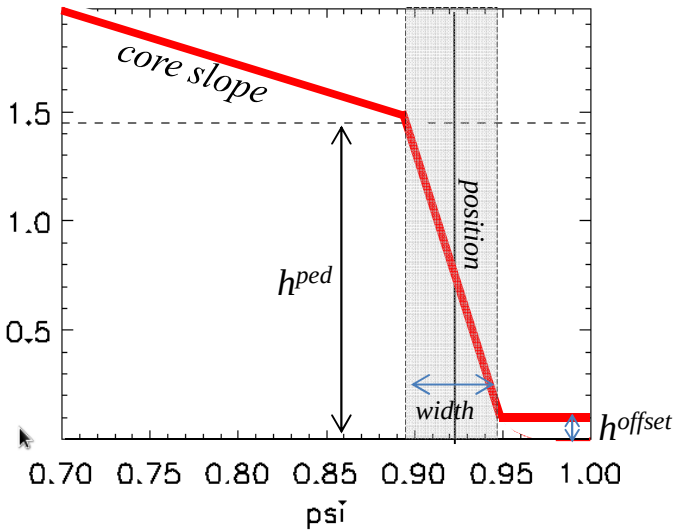
Parameters to store:

- A 5 element array with the mtanh parameters : $[h^{ped}, w, p_{pos}, s, h^{offset}]$.
- The physical parameters separately: height, offset, position, pedestal width and core slope

Mtanh and linear fits

Linear fit definition

We can use any type of parameterization for the linear fit, but the best is to use directly the ”physical” parameters as shown in the figure:



h^{ped}	: pedestal height
h^{offset}	: offest in the SOL
p_{pos}	: pedestal position in ψ_N
$width$	: Pedestal width in ψ_N
$core\ slope$	: derivative of the fit in the region inside the pedestal top

$$linfit\left([h^{ped}, width, \mathrm{p}_{\mathrm{pos}}, scoreslope, h^{offset}], \psi_N\right)$$

Parameters to store:

For consistency with the mtanh we can store both

- A 5 element array with the mtanh parameters : $[h^{ped}, width, p_{pos}, coreslope, h^{offset}]$.
- The physical parameters separately: height, offset, position, pedestal width and core slope separately

(but they will be identical)