Sensitivity indexes of the test function with fixed exponent

Test function

In[65]:=
```
f1[W_, X_, Z_] := a * W * X + b * Z * X^(2)
```

W,X,Z: U[0.5, 1.5]

P :

In[66]:=
```
ClearAll[a, b]
l = 0.5;
h = 6.5;
p = 1 / (h - l);
```

Computation of f for f1:

In[70]:=
```
f0 = Simplify[p^3 * Integrate[f1[W, X, Z], {W, l, h}, {X, l, h}, {Z, l, h}]]
```

Out[70]=
$$12.25\,a + 53.375\,b$$

In[71]:=
```
fw = Simplify[p^2 * Integrate[f1[W, X, Z], {X, l, h}, {Z, l, h}] - f0]
```

Out[71]=
$$0. + a\,(-12.25 + 3.5\,W)$$

In[72]:=
```
fx = Simplify[p^2 * Integrate[f1[W, X, Z], {W, l, h}, {Z, l, h}] - f0]
```

Out[72]=
$$a\,(-12.25 + 3.5\,X) + b\,(-53.375 + 3.5\,X^2)$$

In[73]:=
```
fz = Simplify[p^2 * Integrate[f1[W, X, Z], {W, l, h}, {X, l, h}] - f0]
```

Out[73]=
$$0. + b\,(-53.375 + 15.25\,Z)$$

In[74]:=
```
fwx = Simplify[ p * Integrate[f1[W, X, Z], {Z, l, h}] - f0 - fw - fx]
```

Out[74]=
$$0. + a\,(12.25 - 3.5\,X + W\,(-3.5 + 1.\,X))$$

In[75]:=
```
fwz = Simplify[ p * Integrate[f1[W, X, Z], {X, l, h}] - f0 - fw - fz]
```

Out[75]=
$$0.$$

In[76]:=
```
fxz = Simplify[ p * Integrate[f1[W, X, Z], {W, l, h}] - f0 - fx - fz]
```
Out[76]= $0. + b\left(53.375 - 15.25\,Z + X^2\left(-3.5 + 1.\,Z\right)\right)$

Computation of vt, vw, vx, vz...

In[77]:=
```
vt = Simplify[p^3 * Integrate[(f1[W, X, Z] - f0)^2, {W, l, h}, {X, l, h}, {Z, l, h}]]
```
Out[77]= $0. + 82.5\,a^2 + 514.5\,a\,b + 3049.24\,b^2$

In[78]:=
```
vw = Simplify[p * Integrate[(fw)^2, {W, l, h}]]
```
Out[78]= $0. + 36.75\,a^2$

In[79]:=
```
vx = Simplify[p * Integrate[(fx)^2, {X, l, h}]]
```
Out[79]= $36.75\,a^2 + 514.5\,a\,b + 1888.95\,b^2$

In[80]:=
```
vz = Simplify[p * Integrate[(fz)^2, {Z, l, h}]]
```
Out[80]= $0. + 697.688\,b^2$

In[81]:=
```
vwx = Simplify[p^2 * Integrate[(fwx)^2, {W, l, h}, {X, l, h}]]
```
Out[81]= $0. + 9.\,a^2$

In[82]:=
```
vwz = Simplify[p^2 * Integrate[(fwz)^2, {W, l, h}, {Z, l, h}]]
```
Out[82]= $0.$

In[83]:=
```
vxz = Simplify[p^2 * Integrate[(fxz)^2, {X, l, h}, {Z, l, h}]]
```
Out[83]= $0. + 462.6\,b^2$

Computation of Sw, Sx, Sz...

In[92]:=
```
a = -8;
b = 1.7;
```

In[94]:=
```
sw = vw / vt
```
Out[94]= 0.331497

In[95]:=
```
sx = vx / vt
```
Out[95]= 0.114708

In[96]:=
```
sz = vz / vt
```
Out[96]= 0.284185

In[97]:=
```
swx = vwx / vt
```
Out[97]= 0.0811828

In[98]:= **swz = vwz / vt**

Out[98]= 0.

In[99]:= **sxz = vxz / vt**

Out[99]= 0.188428

In[100]:= **swxz = (vt – vw – vx – vz – vwx – vwz – vxz) / vt**

Out[100]= 1.02549×10^{-15}