Análisis de la sensibilitat per diferents proporcions de cèl·lules

# **Introduction**

Has made a sensitivity analysis that will require the network analyzer to observe the changes in the parameters S when varying the proportion of cells contained in the culture medium.

# **Scenario**

**MATLAB:**

**Scenario 1:**

* Coaxial with a Holder Sampler of z= 3mm

**Scenario 2:**

* Coaxial with a Holder Sampler of z= 10mm

**HFSS:**

**Scenario 1:**

* Coaxial with holder sampler of z=3 mm.
* SMA with Teflon
* Holder Extern = 10.5 mm.
* Holder Intern = 6 mm.

**Scenario 2:**

* Coaxial with holder sampler of z=3 mm.
* SMA with vacuum
* Holder Extern = 11.5 mm – 5mm
* Holder Intern = 6 mm – 5mm.

# **Results**

## MATLAB

### Scenario 1

z = 3mm

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cell proportion** | **9,9609E+07** | **3,0990E+08** | **1,0938E+09** | **3,0000E+09** | **(Hz)** |
|  | ***S21*** | | | |  |
| **0,1** | 0,979212197 | 0,979098225 | 0,978895353 | 0,978745761 |  |
| **0,05** | 0,978732458 | 0,978673881 | 0,978572221 | 0,978497413 |  |
| **0,025** | 0,97849116 | 0,978461468 | 0,978410582 | 0,978373175 |  |
| **0,0125** | 0,978370149 | 0,978355201 | 0,978329744 | 0,97831104 |  |
| **0** | 0,978248894 | 0,978248894 | 0,978248894 | 0,978248894 |  |
|  | *Table 1.1* | | | |  |
|  |  |  |  |  |  |
|  | ***Sensitivity*** | | | |  |
| **0,1** | 0,000983753 | 0,000867462 | 0,000660396 | 0,000507657 |  |
| -60,14228048 | -61,23498589 | -63,60390771 | -65,88858889 | **dB** |
| **0,05** | 0,000494072 | 0,000434248 | 0,000330407 | 0,000253981 |  |
| -66,12419108 | -67,24525341 | -69,61901291 | -71,90399192 | **dB** |
| **0,025** | 0,000247592 | 0,000217253 | 0,000165256 | 0,000127028 |  |
| -72,12527316 | -73,26066659 | -75,63685548 | -77,92198224 | **dB** |
| **0,0125** | 0,00012392 | 0,000108647 | 8,26343E-05 | 6,35197E-05 |  |
| -78,13714467 | -79,27961139 | -81,65679191 | -83,94182621 | **dB** |
|  | *Table 1.2* | | | |  |
|  |  |  |  |  |  |
|  | ***Sensitivity*** | | | |  |
| **0,1** | -60,14228048 | -61,23498589 | -63,60390771 | -65,88858889 | **dB** |
| **0,05** | -66,12419108 | -67,24525341 | -69,61901291 | -71,90399192 | **dB** |
| **0,025** | -72,12527316 | -73,26066659 | -75,63685548 | -77,92198224 | **dB** |
| **0,0125** | -78,13607041 | -79,278668 | -81,65607423 | -83,94127457 | **dB** |
|  | *Table 1.3* | | | |  |

### Scenario 2

z = 10mm

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cell proportion** | **9,9609E+07** | **3,0990E+08** | **1,0938E+09** | **3,0000E+09** | **(Hz)** |
|  | ***S21*** | | | |  |
| **0,1** | 0,932372339 | 0,932010655 | 0,931367092 | 0,930892749 |  |
| **0,05** | 0,930850575 | 0,930664881 | 0,930342678 | 0,930105629 |  |
| **0,025** | 0,930085817 | 0,929991743 | 0,929830535 | 0,929712041 |  |
| **0,0125** | 0,929702456 | 0,92965511 | 0,929574479 | 0,92951524 |  |
| **0** | 0,929318434 | 0,929318434 | 0,929318434 | 0,929318434 |  |
|  | *Table 2.1* | | | |  |
|  |  |  |  |  |  |
|  | ***Sensittivity*** | | | |  |
| **0,1** | 0,003275414 | 0,002888616 | 0,002199625 | 0,001691189 |  |
| -49,6946758 | -50,7862025 | -53,1530256 | -55,4361587 | **dB** |
| **0,05** | 0,001645958 | 0,001446758 | 0,001100932 | 0,000846351 |  |
| -55,6716232 | -56,7920792 | -59,1647863 | -61,4489908 | **dB** |
| **0,025** | 0,000825068 | 0,000723995 | 0,000550747 | 0,000423365 |  |
| -61,6702073 | -62,8052933 | -65,1809552 | -67,4656946 | **dB** |
| **0,0125** | 0,000412889 | 0,00036202 | 0,000275368 | 0,000211685 |  |
| -67,6833323 | -68,8253388 | -71,201729 | -73,4861822 | **dB** |
|  | *Table 2.2* | | | |  |
|  |  |  |  |  |  |
|  | ***Sensittivity*** | | | |  |
| **0,1** | -49,6946758 | -50,7862025 | -53,1530256 | -55,4361587 | **dB** |
| **0,05** | -55,6716232 | -56,7920792 | -59,1647864 | -61,4489908 | **dB** |
| **0,025** | -61,6702073 | -62,8052933 | -65,1809552 | -67,4656946 | **dB** |
| **0,0125** | -67,6797514 | -68,8221942 | -71,1993368 | -73,4843434 | **dB** |
|  | *Table 2.3* | | | |  |





## HFSS

### Scenario 1



# **Conclusions**

* De forma analítica amb el MATLAB, es pot veure que podem tenir una bona sensibilitat si augmentem l’altura a 10mm, per a qualsevol concentració de cèl·lules.
* De moment els resultats no s’han pogut replicar del MATLAB a l’HFSS.
* Els reusaltats obtinguts pel cas parametric encara s’han de revisar per això no els adjunto al document.
* Estic treballant els resultats pel cas parametric, però de moment no els hi trobo sentit als resultats.