4.7 Planar ultra wideband antennas

Developing Matlab

This program is designed to determine the approximate parameters of a broadband antenna. Mathematical relationships are given in layer B.

Select a substrate permittivity ε_r and substrate thickness T (4.7B.1)

```
T_test=0.06*(lambda_res3/sqrt(eps_r));

if T>= T_test
else
    T_test=T
end
```

Calculate of the width of the patch A (4.7B.2), (4.7B.3)

```
% Estimate the quantity B+2deltaB
B_dve_delta_B = c0/(2*(sqrt(eps_r))*fres3);

% Calculate of the width of the patch A
A=1.5*(B_dve_delta_B)
```

Back calculate of the length of the patch B (4.7B.4), (4.7B.5), (4.7B.6)

```
% Calculate of the effective permitivity eps_eff and parameter 2deltaB
eps_eff=((eps_r+1)/2)+((eps_r-1)/2)*sqrt(1+((12*T)/A));
dve_delta_B=0.824*T*((eps_eff+0.3)*((A/T)+0.262)/((eps_eff-0.258)*
((A/T)+0.813)));

% Backcalculate of the length of the patch B
B=(c0/(2*sqrt(eps_eff)*fres3))-dve_delta_B
```

Select a starting value of slot thickness E, F (4.7B.7), (4.7B.8)

```
% Select a starting value of slot thickness E and F
E=lambda_res3/60
F=E

% Calculate width of U-slot D
D=(c0/(sqrt(eps_eff)*fres2))-(2*(B+dve_delta_B-E))
```

Select C such that is be satisfied rule (4.7B.9)

```
% Select C such that
C1=0.33*A;
C2=0.9*D;
```

Estimate of the position U-slot (4.7B.10), (4.7B.11), (4.7B.12)

```
% Calculate the effective permittivity and effective length extension of
the pseudopatch of the fourth resonance with effective patch width as D-2F
eps_eff_PP=((eps_r+1)/2)+((eps_r-1)/2)*sqrt(1+((12*T)/(D-2*F)));
dve_delta_B_E_H=0.824*T*((eps_eff_PP+0.3)*(((D-2*F)/T)+0.262)/((eps_eff_PP-
0.258)*(((D-2*F)/T)+0.813)));

% Estimate of the position U-slot
H=B-E+dve_delta_B_E_H-(1/sqrt(eps_eff_PP))*((c0/fres4)-(2*C1+D))
```

For broadband antennas must be the condition (4.7B.13)

```
% Check that sum C+E+H is less than B. If not adjust C by changing the
rations in step 9 and value of H until the design is physically realizable.
if C1+E+H<=B
else
    C1=C2
    H=B-E+dve_delta_B_E_H-(1/sqrt(eps_eff_PP))*((c0/fres4)-(2*C1+D))
end
C=C1
```