微波网络设计

题目选择第二题

- 做的时候找资料并分析阶数，再对应表格结合腾讯元宝给出的公式计算LC大小，反推出长度。
  - 使用微带线设计一个低通滤波器_5级微带低通滤波器设计-CSDN博客

TABLE 3.2 Element values for Chebyshev lowpass prototype filters ($g_0 = 1.0$, $\Omega_c = 1$)

For passband ripple $L_{Ar} = 0.01$ dB

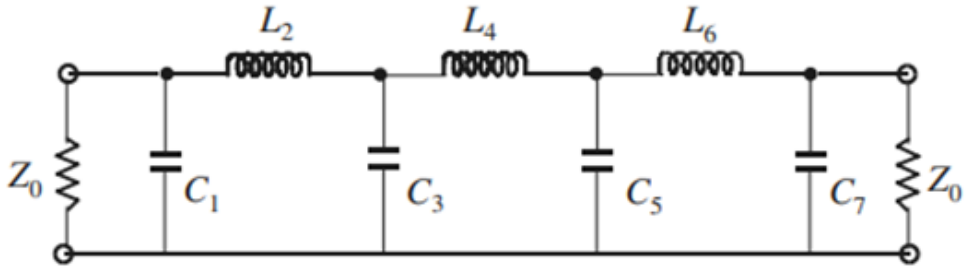
n	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}
1	0.0960	1.0								
2	0.4489	0.4078	1.1008							
3	0.6292	0.9703	0.6292	1.0						
4	0.7129	1.2004	1.3213	0.6476	1.1008					
5	0.7563	1.3049	1.5773	1.3049	0.7563	1.0				
6	0.7814	1.3600	1.6897	1.5350	1.4970	0.7098	1.1008			
7	0.7970	1.3924	1.7481	1.6331	1.7481	1.3924	0.7970	1.0		
8	0.8073	1.4131	1.7825	1.6833	1.8529	1.6193	1.5555	0.7334	1.1008	
9	0.8145	1.4271	1.8044	1.7125	1.9058	1.7125	1.8044	1.4271	0.8145	1.0

For passband ripple $L_{Ar} = 0.04321$ dB

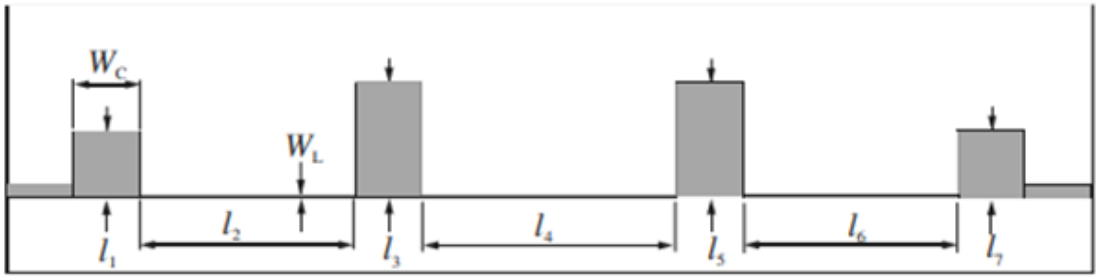
n	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}
1	0.2000	1.0								
2	0.6648	0.5445	1.2210							
3	0.8516	1.1032	0.8516	1.0						
4	0.9314	1.2920	1.5775	0.7628	1.2210					
5	0.9714	1.3721	1.8014	1.3721	0.9714	1.0				
6	0.9940	1.4131	1.8933	1.5506	1.7253	0.8141	1.2210			
7	1.0080	1.4368	1.9398	1.6220	1.9398	1.4368	1.0080	1.0		
8	1.0171	1.4518	1.9667	1.6574	2.0237	1.6107	1.7726	0.8330	1.2210	
9	1.0235	1.4619	1.9837	1.6778	2.0649	1.6778	1.9837	1.4619	1.0235	1.0

For passband ripple $L_{Ar} = 0.1$ dB

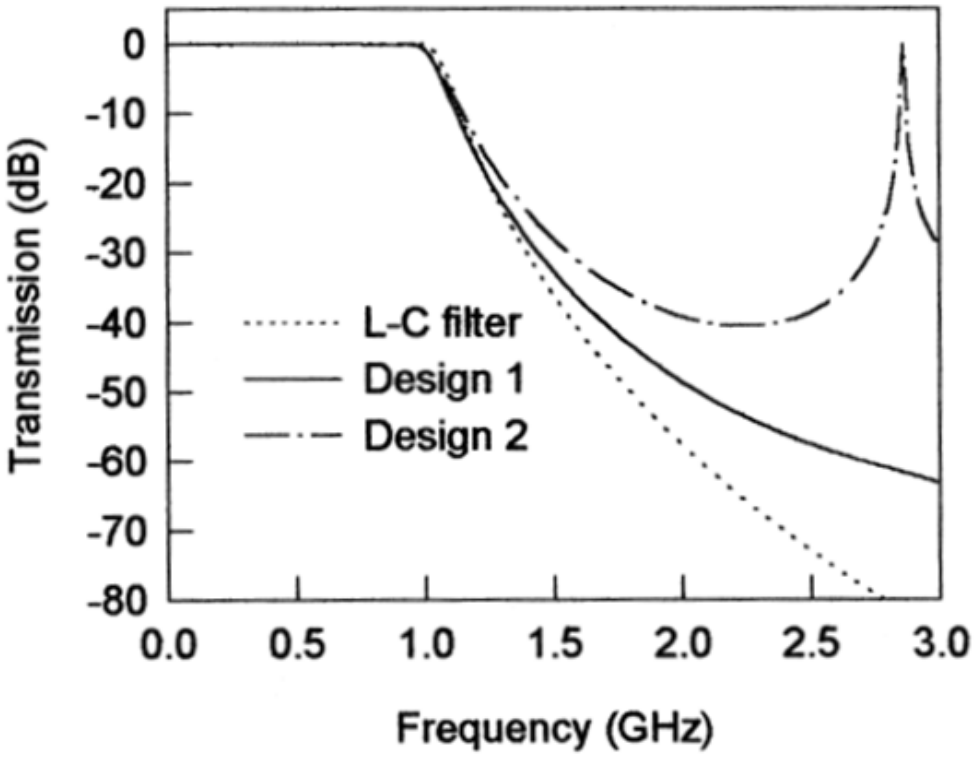
n	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}
1	0.3052	1.0								
2	0.8431	0.6220	1.3554							
3	1.0316	1.1474	1.0316	1.0						
4	1.1088	1.3062	1.7704	0.8181	1.3554					
5	1.1468	1.3712	1.9750	1.3712	1.1468	1.0				
6	1.1681	1.4040	2.0562	1.5171	1.9029	0.8618	1.3554			
7	1.1812	1.4228	2.0967	1.5734	2.0967	1.4228	1.1812	1.0		
8	1.1898	1.4346	2.1199	1.6010	2.1700	1.5641	1.9445	0.8778	1.3554	
9	1.1957	1.4426	2.1346	1.6167	2.2054	1.6167	2.1346	1.4426	1.1957	1.0



(a)



(b)



(c)

思路

- 在老师给出的文档中的模型的基础上建模

- 根据文档表格进行LC电路中具体电容值的计算
  - 计算过程已经在matlab代码中表示了
    -

```
Z0=50;

fc=10^9;

gk=[1.1812,1.4228,2.0967,1.5734,2.0967,1.4228,1.1812];

res=[];

for i=1:7

if rem(i,2)==0

res(1,i)=Z0*gk(1,i)/(2*pi*fc);

else

res(1,i)=gk(1,i)/(2*pi*fc*Z0);

end

end

end
```

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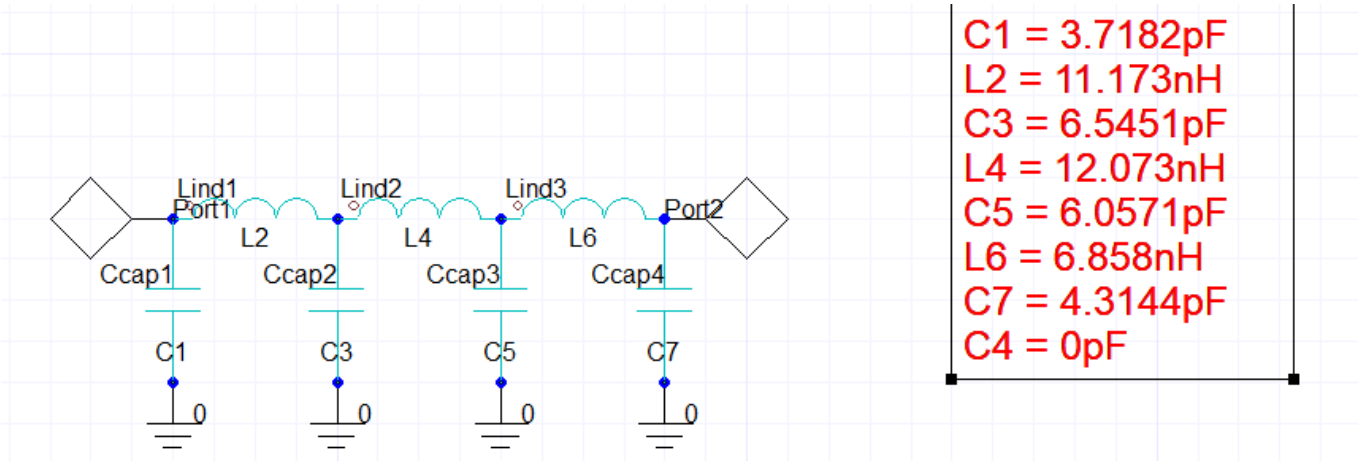
结果

1x7 double

	1	2	3	4	5	6	7
1	3.7599e-12	1.1322e-08	6.6740e-12	1.2521e-08	6.6740e-12	1.1322e-08	3.7599e-12
2							

根据该结果建模如下



- 接下来进行物理建模
  - 用AWR的TXline工具进行微带线的参数计算
    -

4. 计算特性阻抗

- **高阻抗线**：$Z_H = g_i \cdot Z_0$，例如 $Z_H = 112.4\Omega$（当 $g_i = 2.25$, $Z_0 = 50\Omega$） [10]
- **低阻抗线**：$Z_L = \frac{Z_0}{g_i}$，例如 $Z_L = 18.2\Omega$（当 $g_i = 2.75$, $Z_0 = 50\Omega$） [10]

  - 用HFSS进行仿真
- 结果满足要求