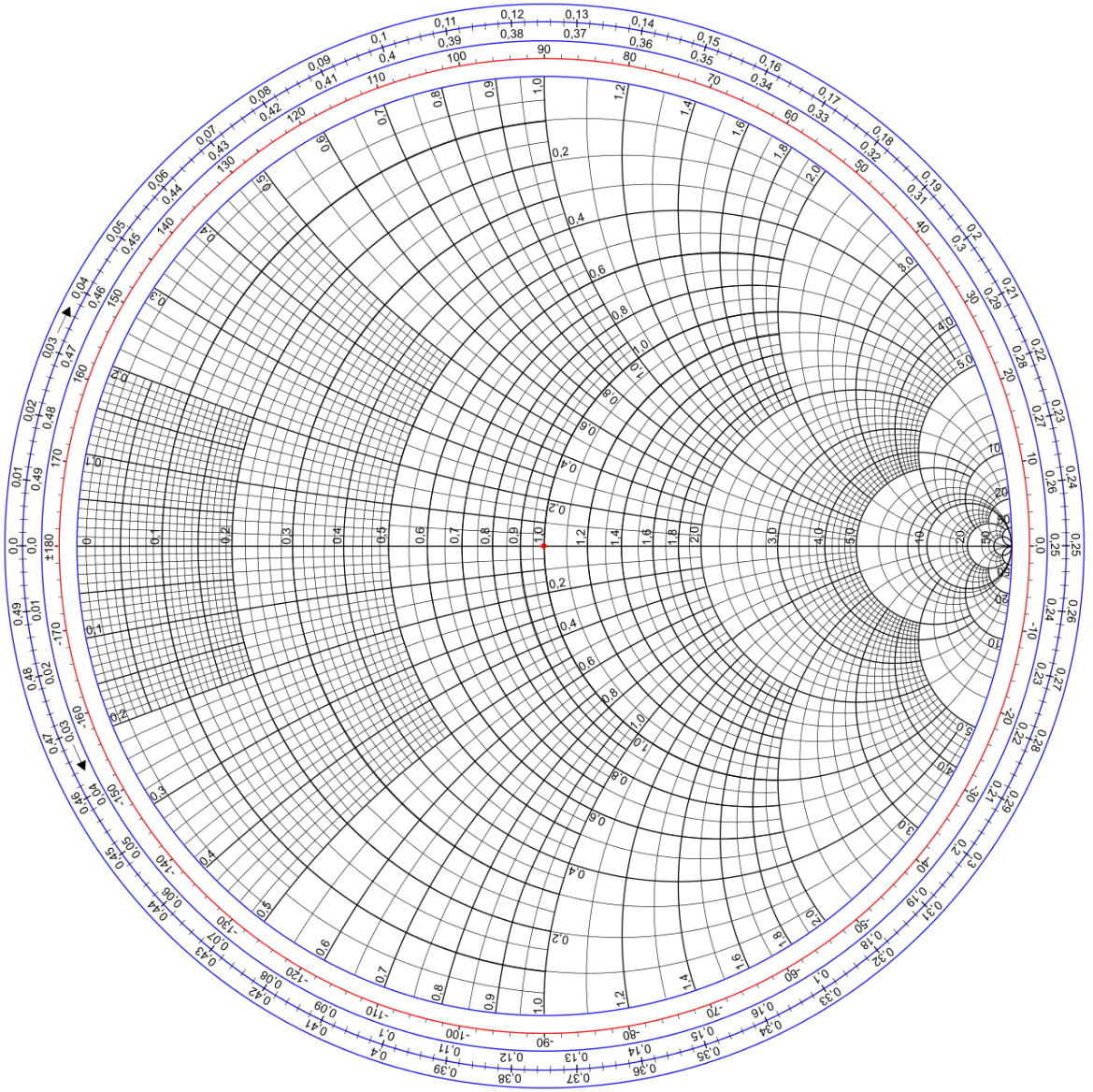
Das Smith-Diagramm



Erfinder des Smith-Diagramm

- Phillip Hagar Smith

  * 29. April 1905 in Lexington, Massachusetts

  † 29. August 1987 in Berkeley Heights, New Jersey

  war US-amerikanischer Ingenieur und erfand 1937 das Smith-Diagramm

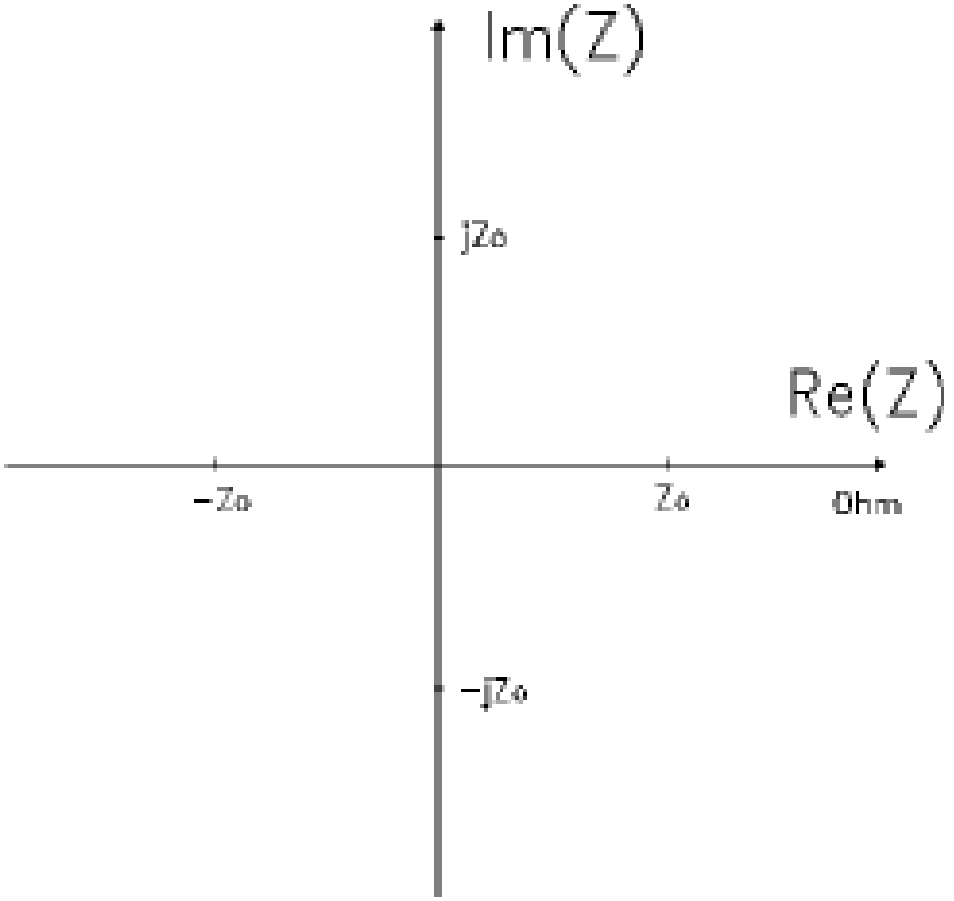
Was ist das Smith-Diagramm?

- Hilfsmittel der komplexen Wechselstromrechnung, mit dem Berechnungen komplexer Widerstände (Impedanzen) auf eine geometrische Konstruktion zurückgeführt werden können.
- Hilfsmittel, das in der Leitungstheorie zur Impedanz-anpassung verwendet wird.

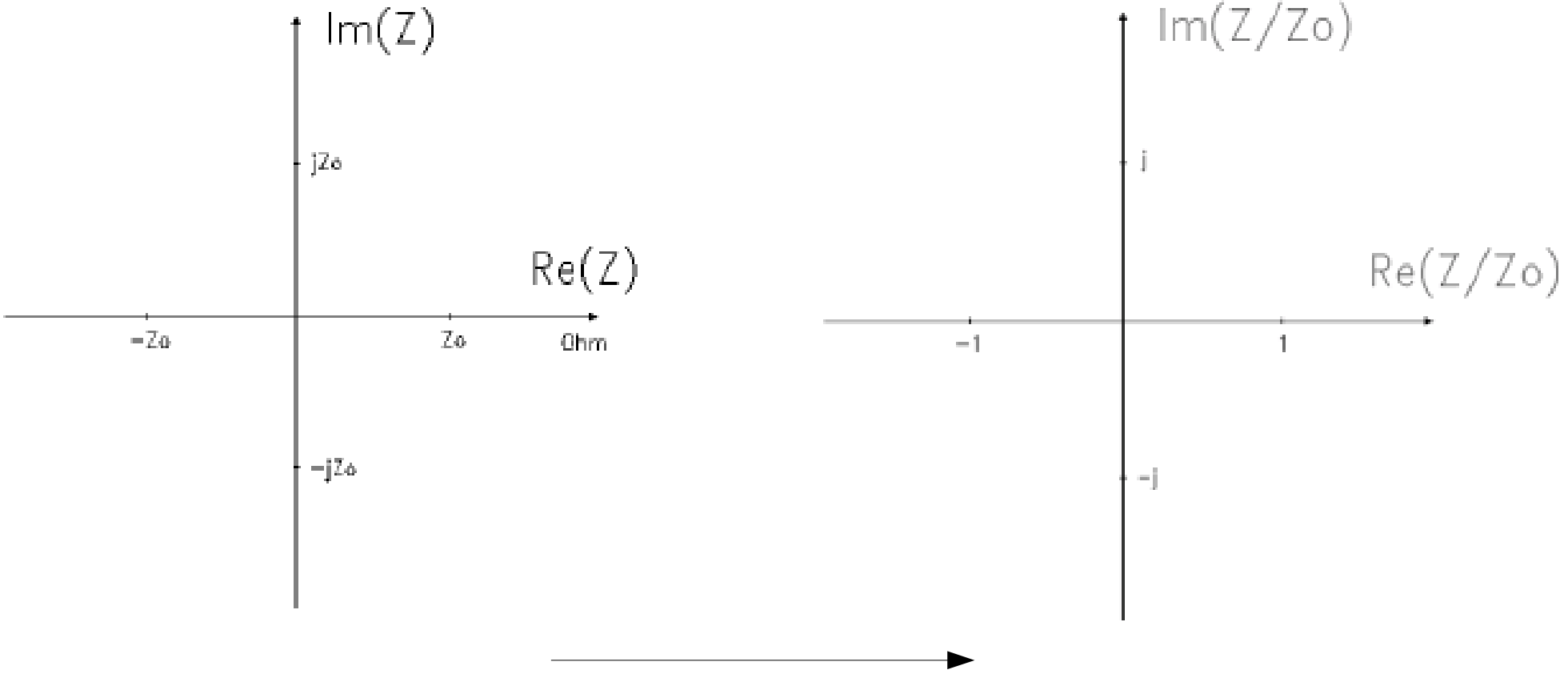
Verwendung des Smith-Diagramms

- Smith-Diagramme auf Papier werden heute nur noch im Bereich der Ausbildung und zur Dokumentation verwendet.
- In der Praxis werden die Papierdiagramme inzwischen durch entsprechende Software ersetzt.
- Spezielle Messgeräte wie z.B. Netzwerkanalysatoren können gemessene Daten oft direkt in Form von Smith-Diagrammen anzeigen.

Der Weg zum Smith-Diagramm (1)

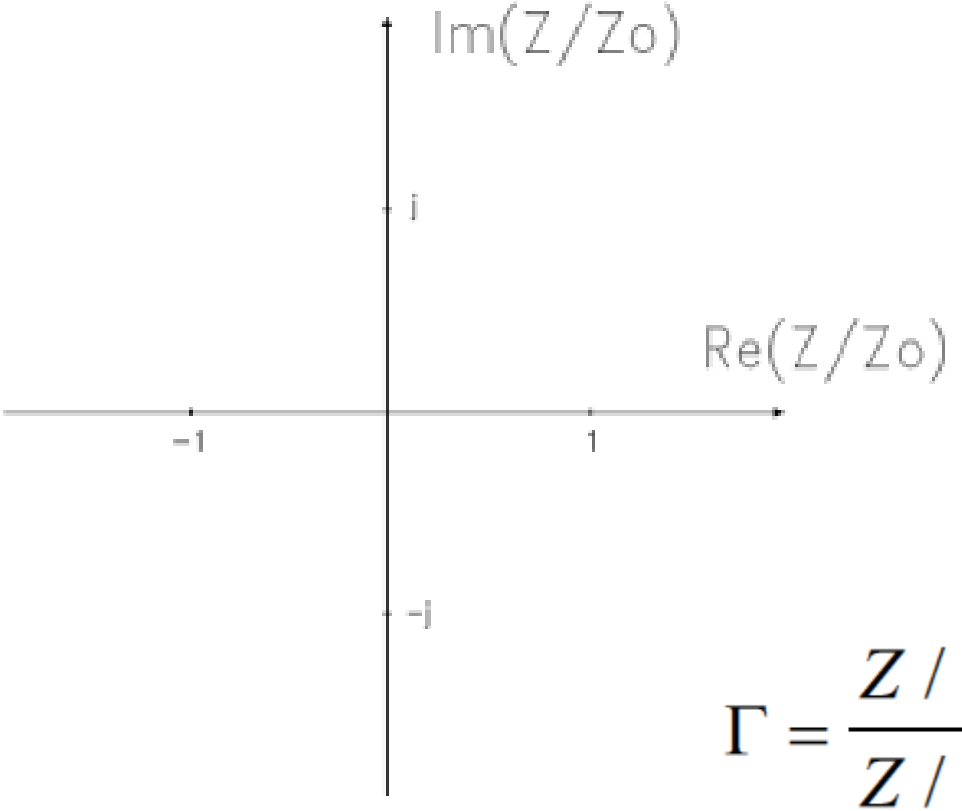


Der Weg zum Smith-Diagramm (2)

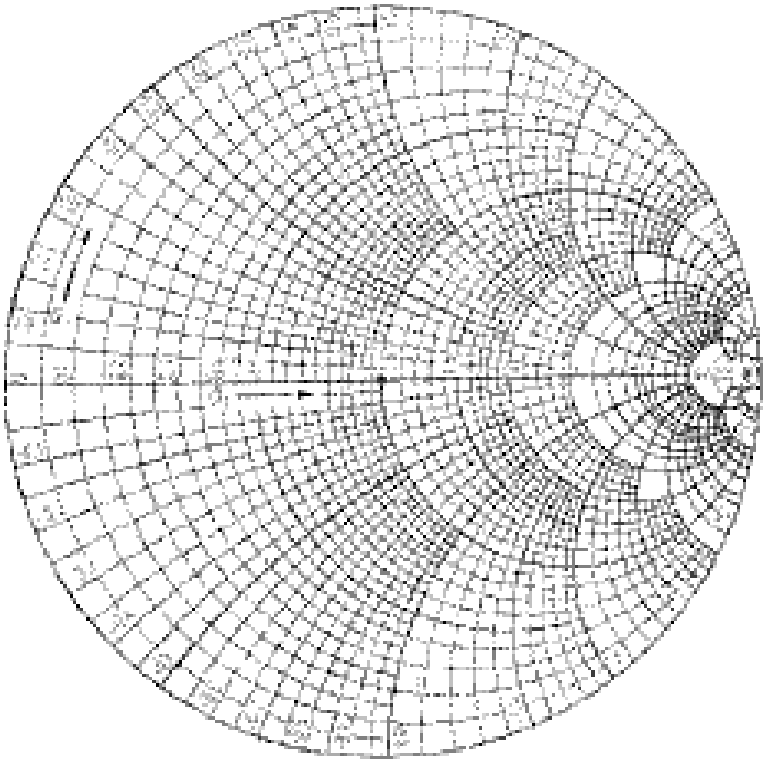


Normierung der Impedanzebene auf Zo (meistens 50 Ohm)

Der Weg zum Smith-Diagramm (3)

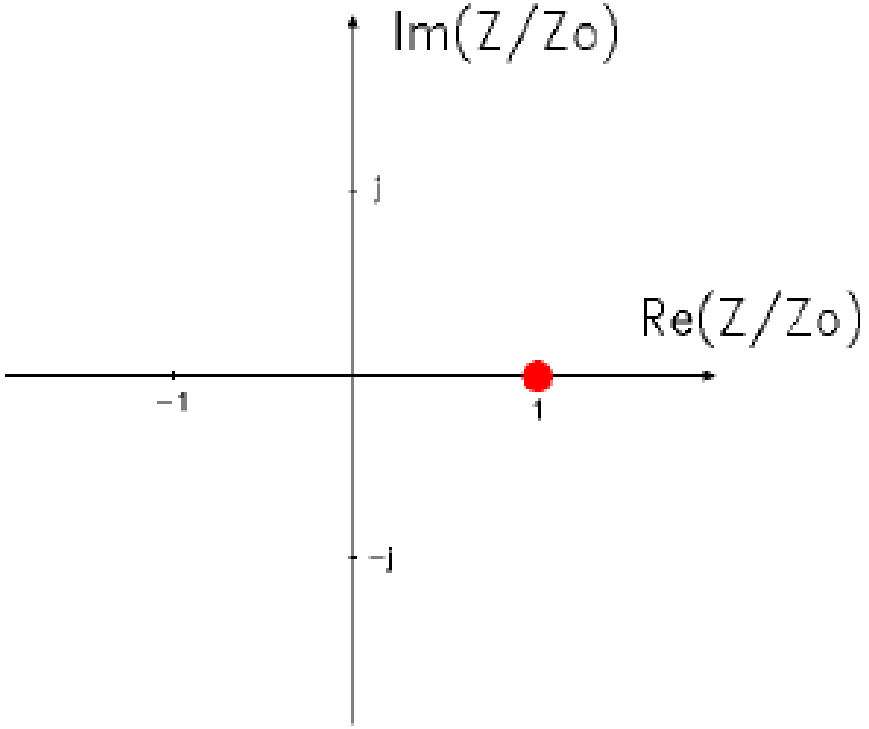


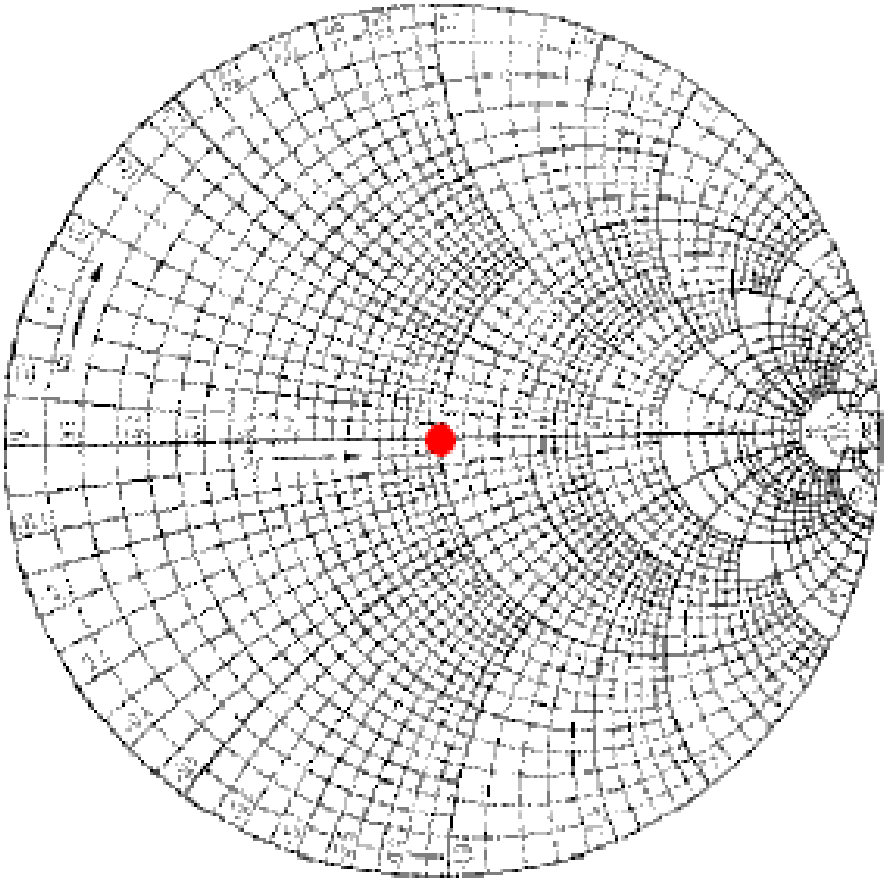
$$\Gamma = \frac{Z / Zo - 1}{Z / Zo + 1}$$



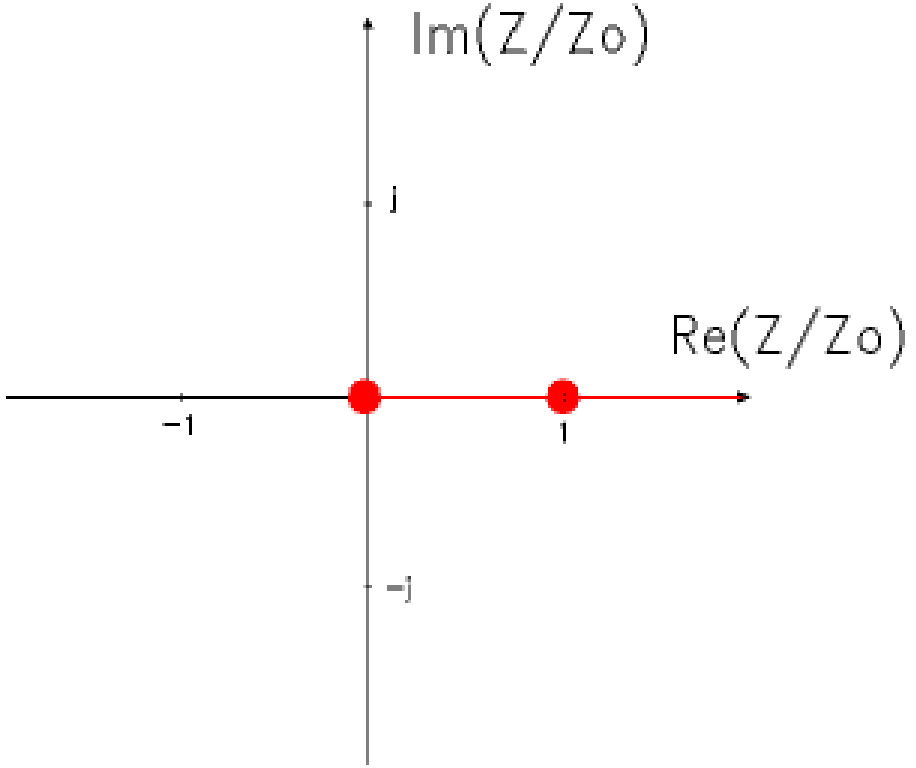
Transformation der normierten Impedanzebene
in die Reflektionsfaktorebene

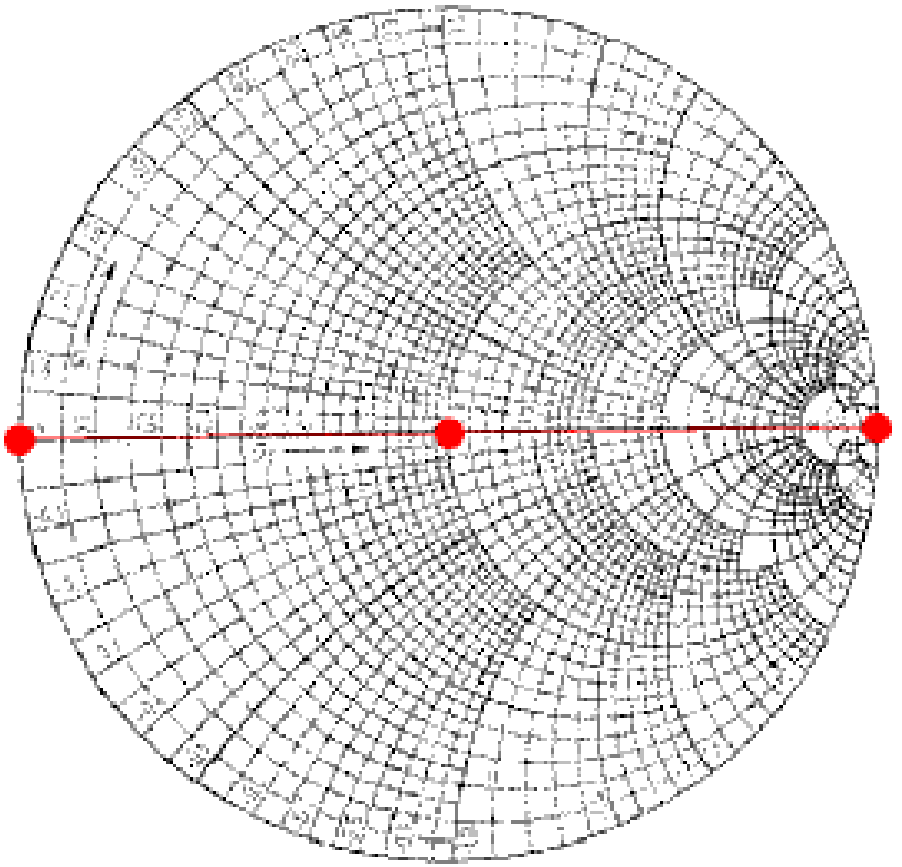
R, L, C im Smith-Diagramm



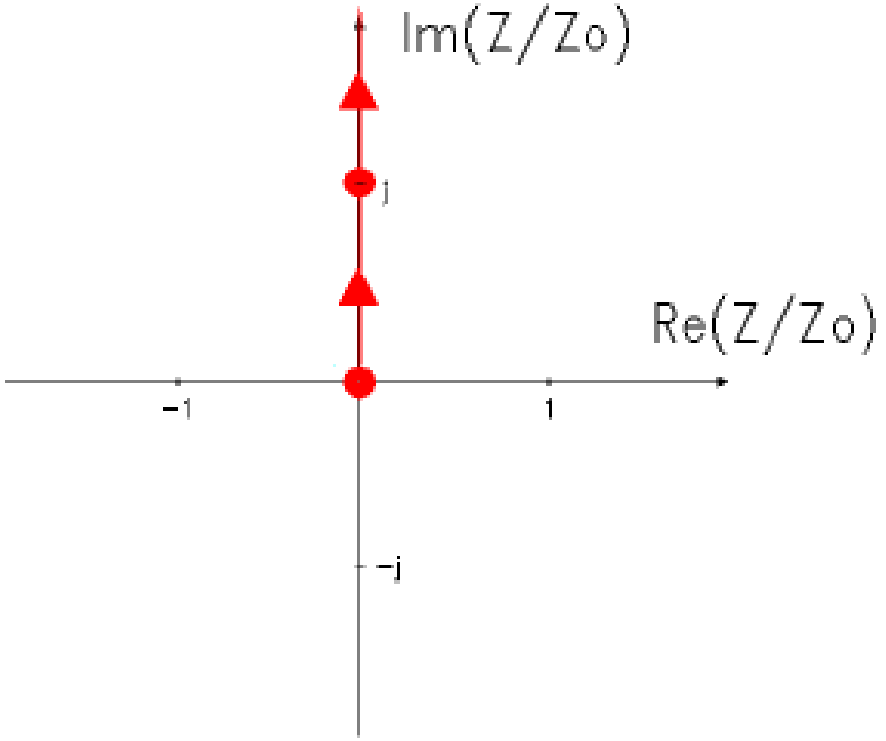


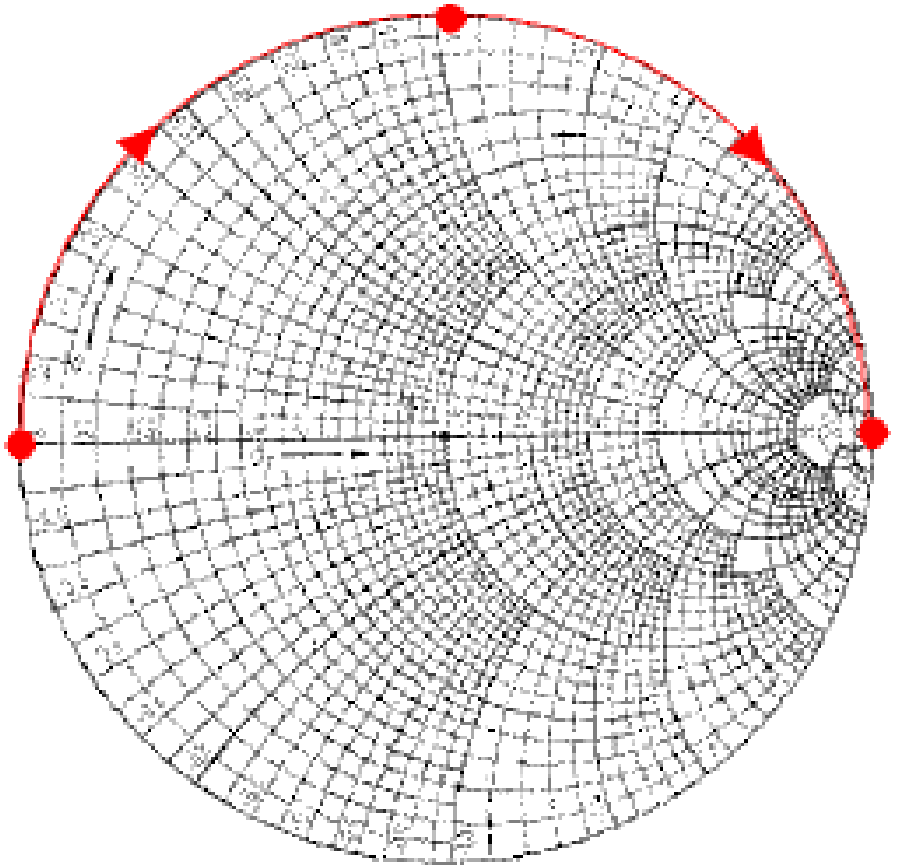
R, L, C im Smith-Diagramm



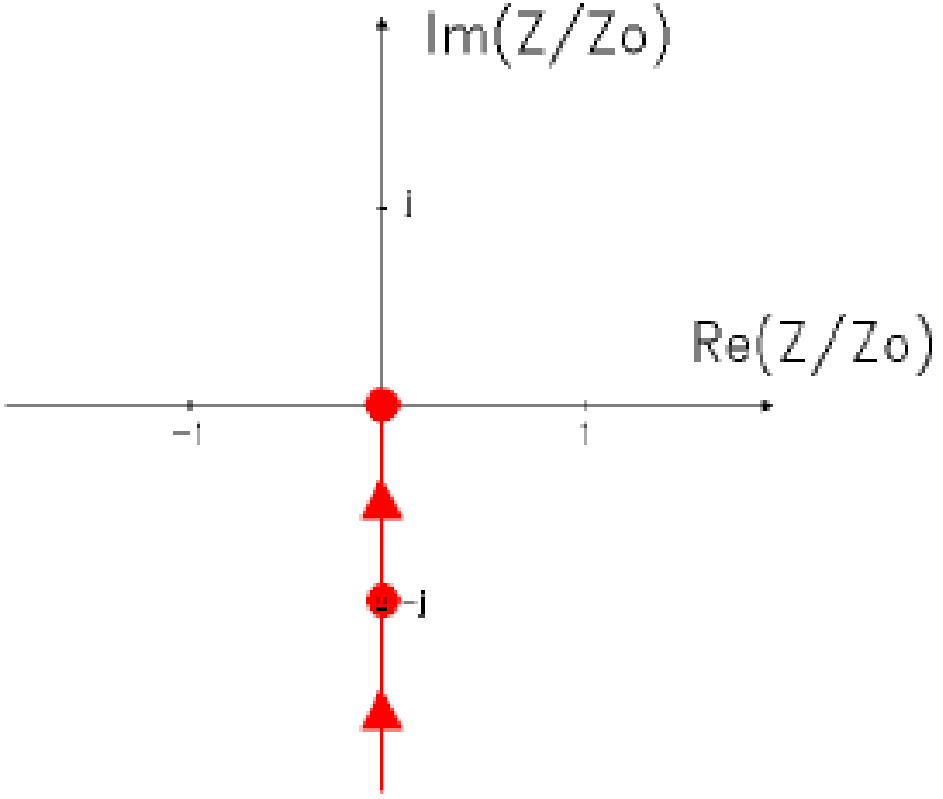


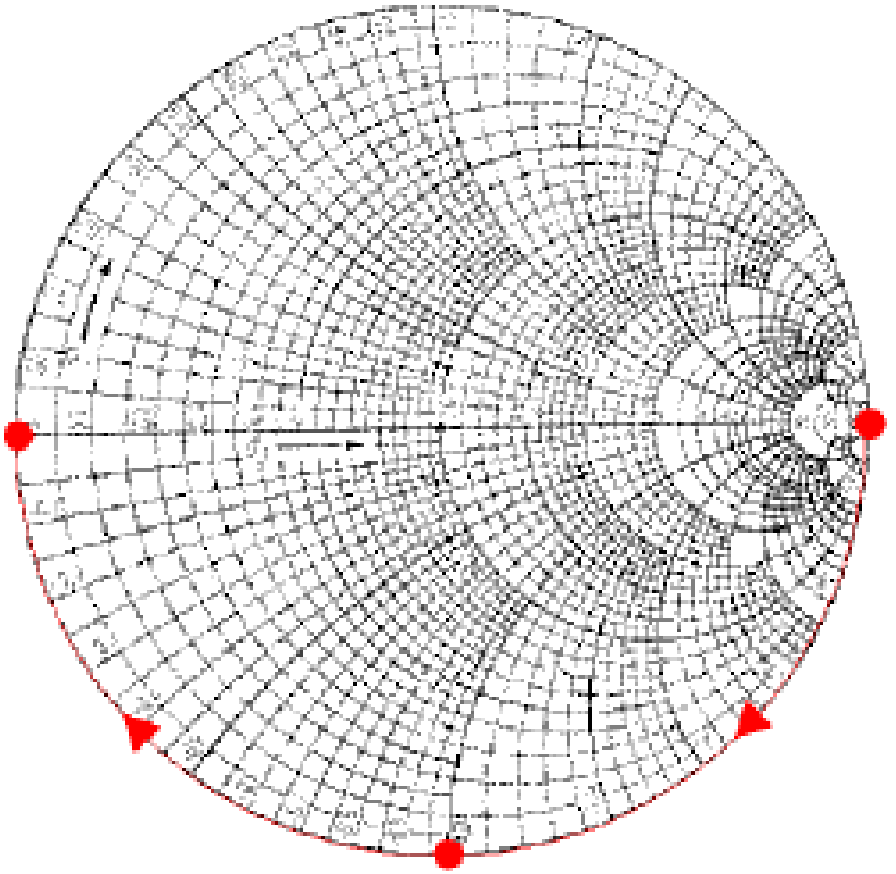
R, L, C im Smith-Diagramm



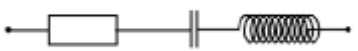


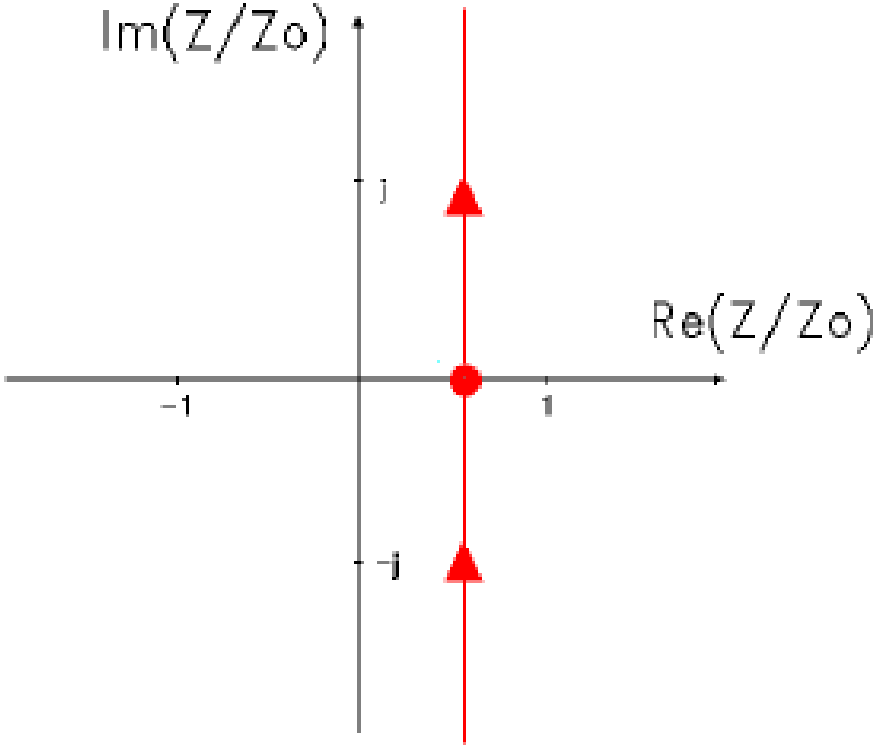
R, L, **C** im Smith-Diagramm

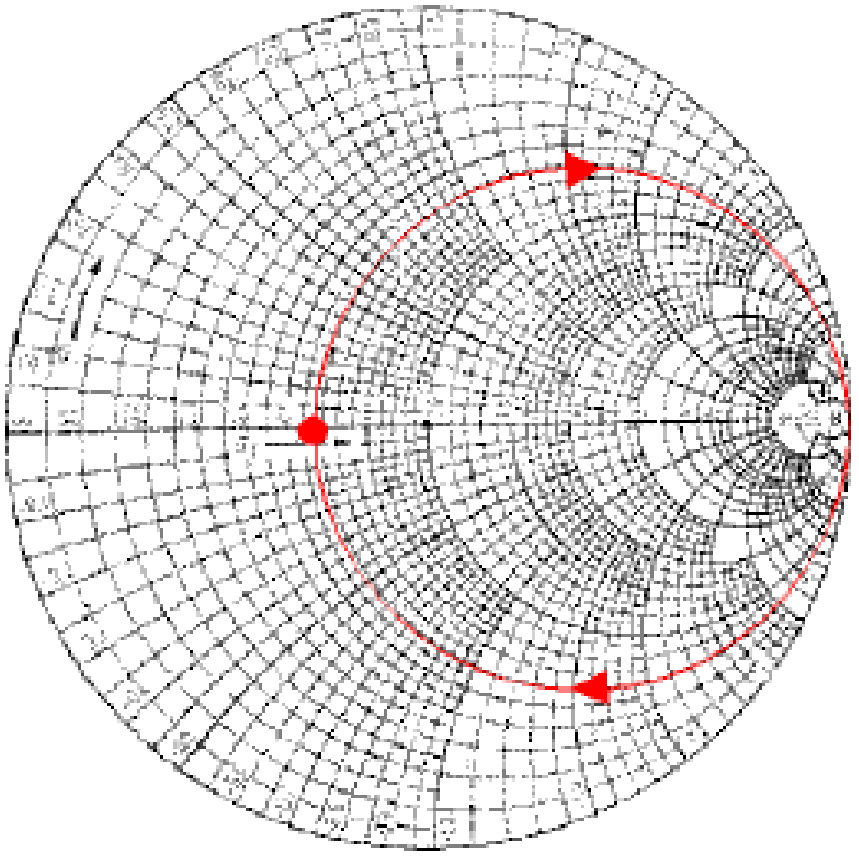




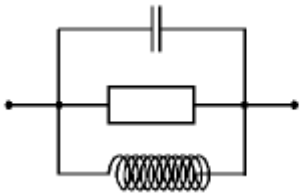
Serienschaltung im Smith-Diagramm

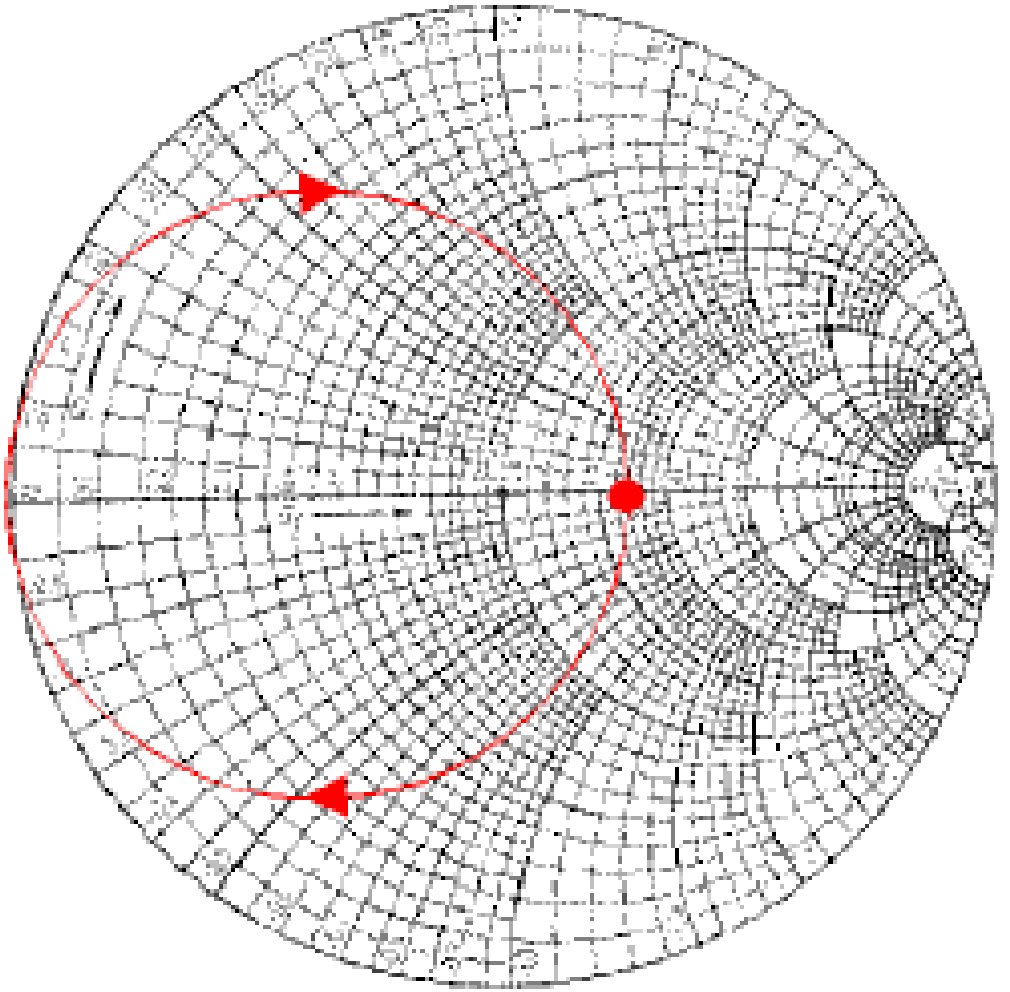




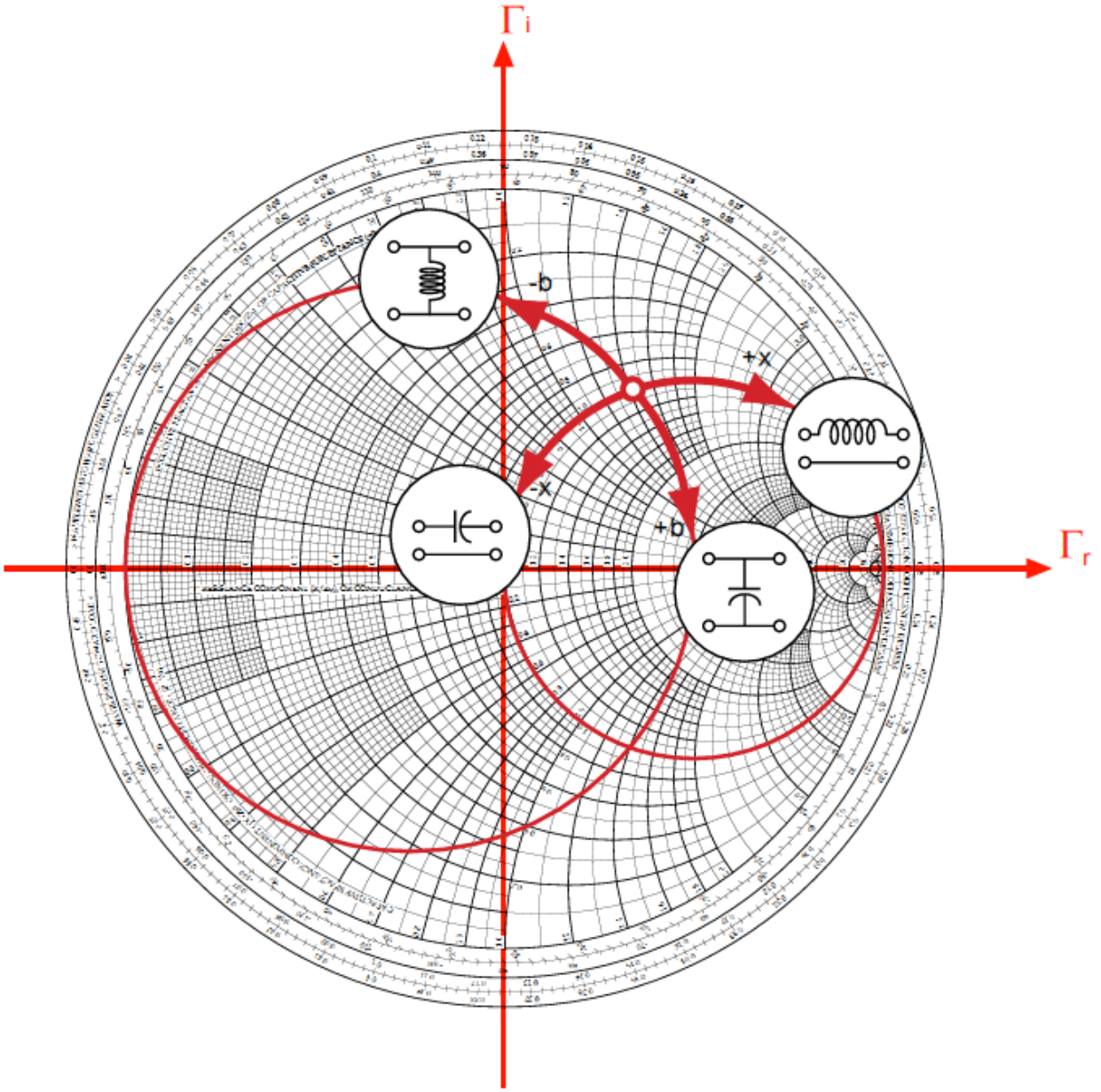


Parallelschaltung im Smith-Diagramm

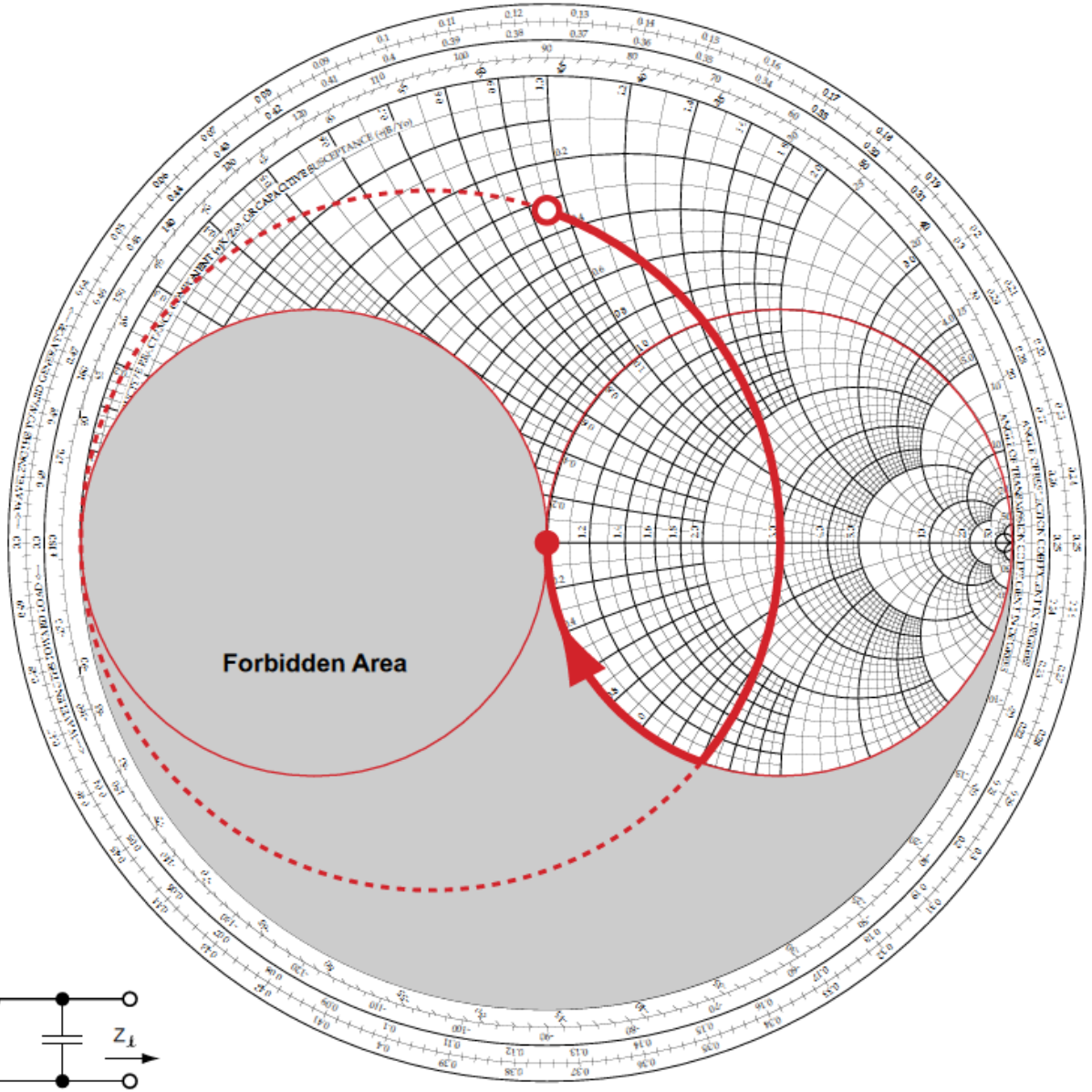




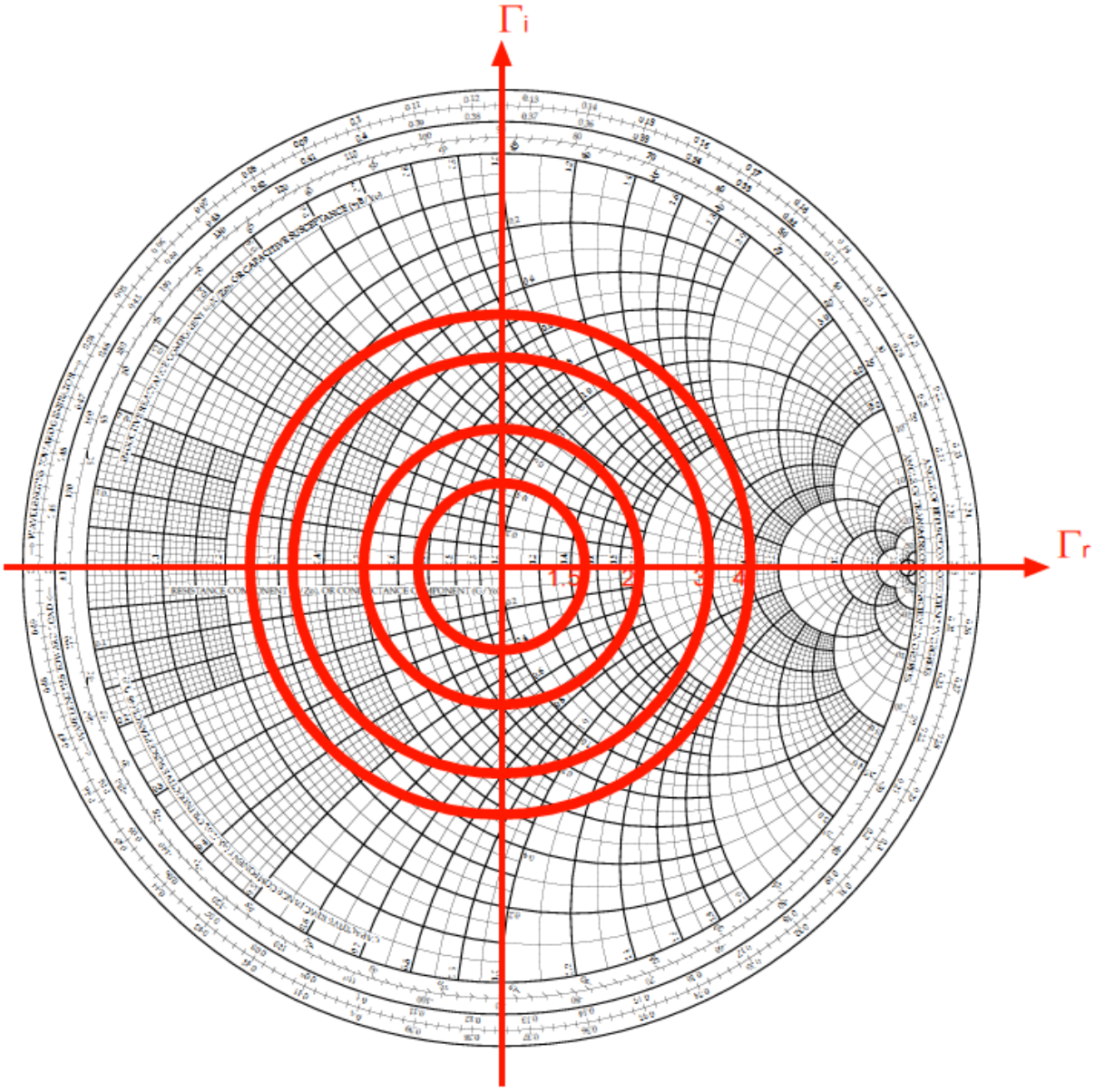
R, L, C im Smith-Diagramm



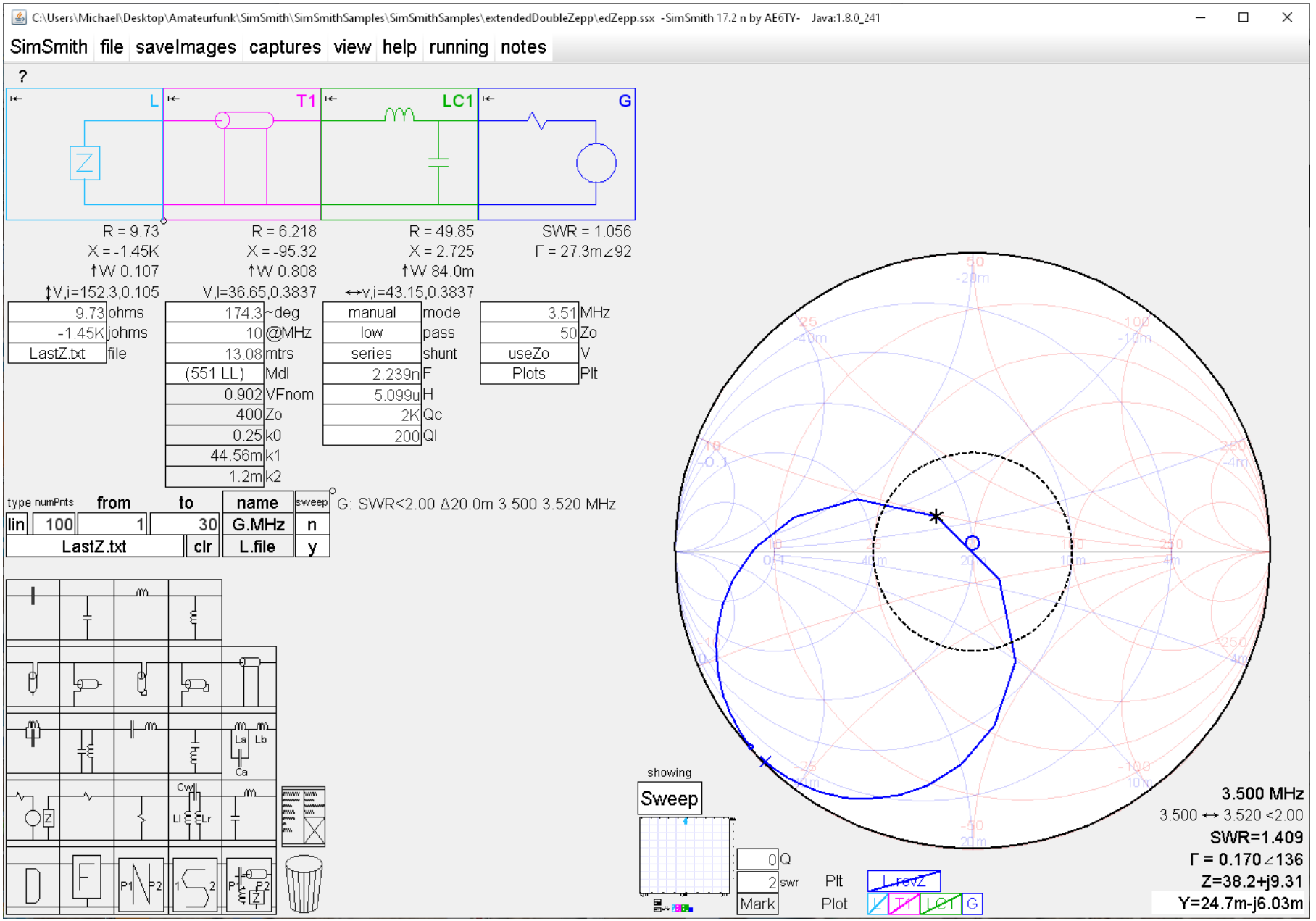
Anpassung im Smith-Diagramm



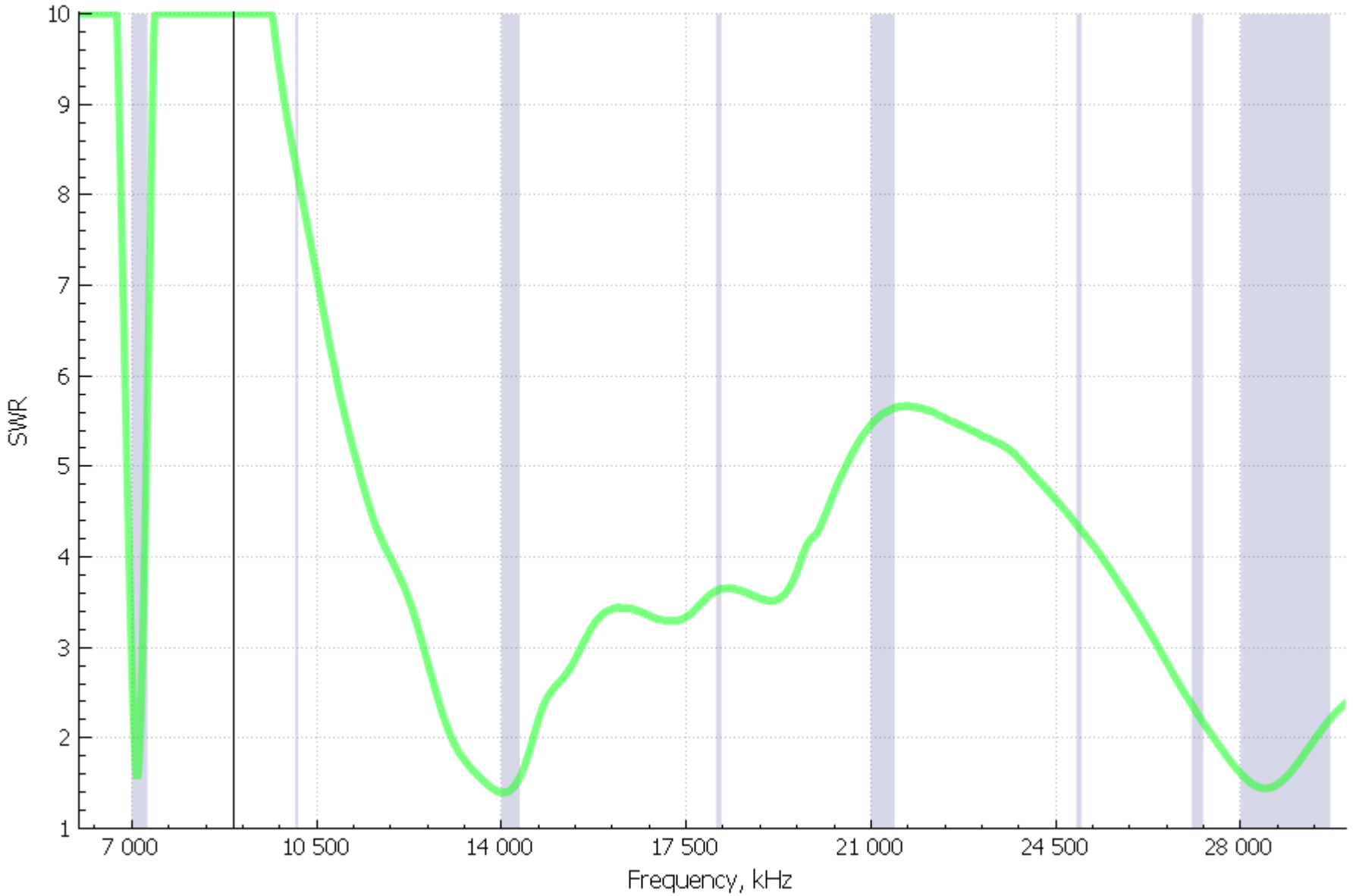
Das SWR im Smith-Diagramm



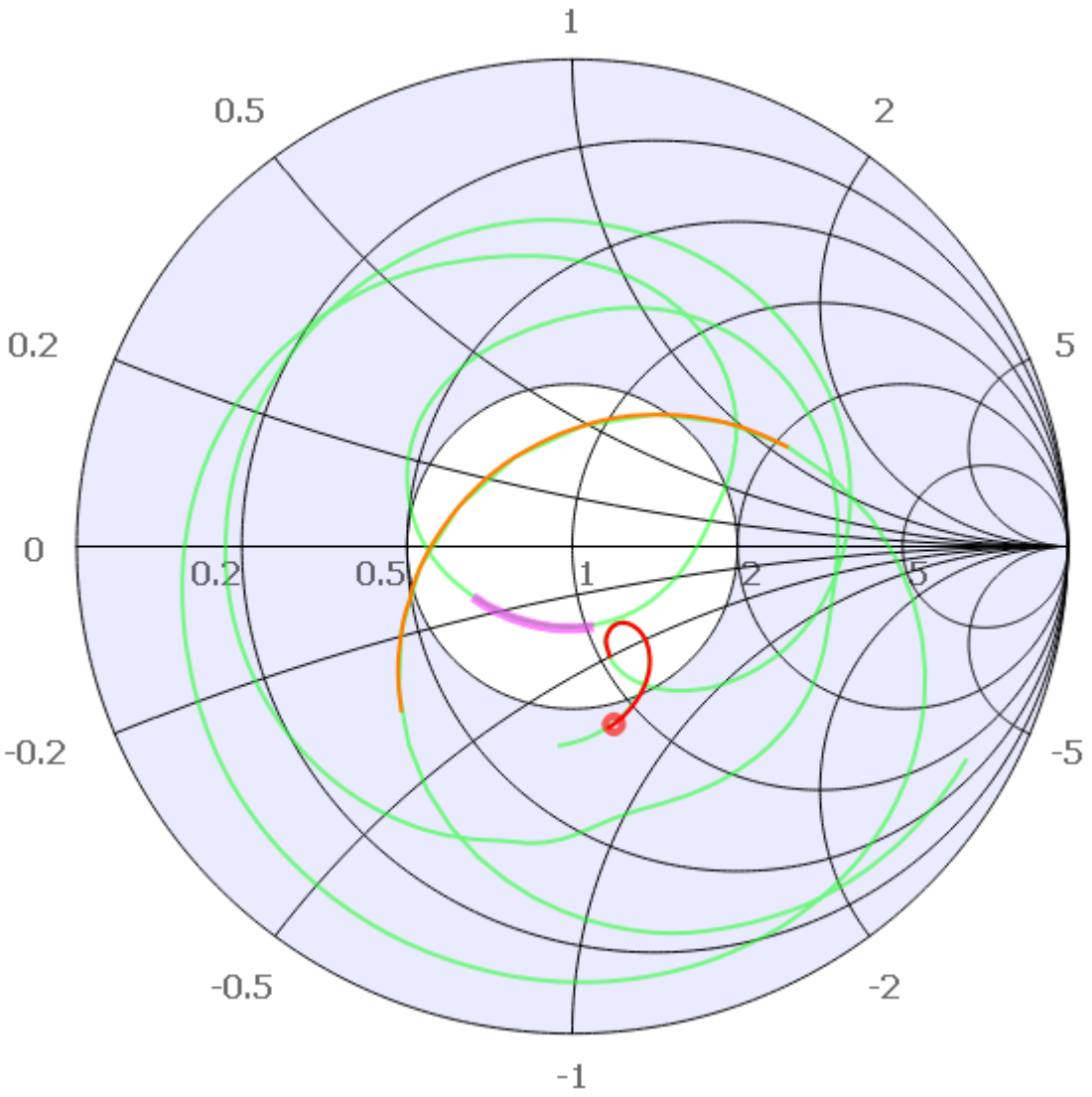
Software für Smith-Diagramme



SWR-Messung 40-20-10 EF

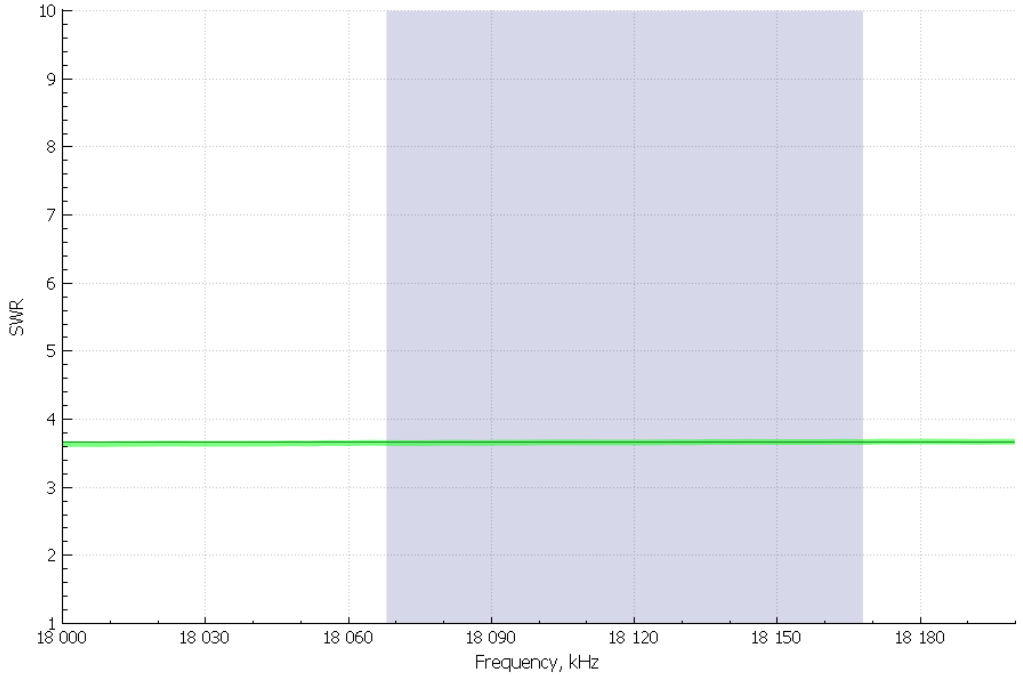


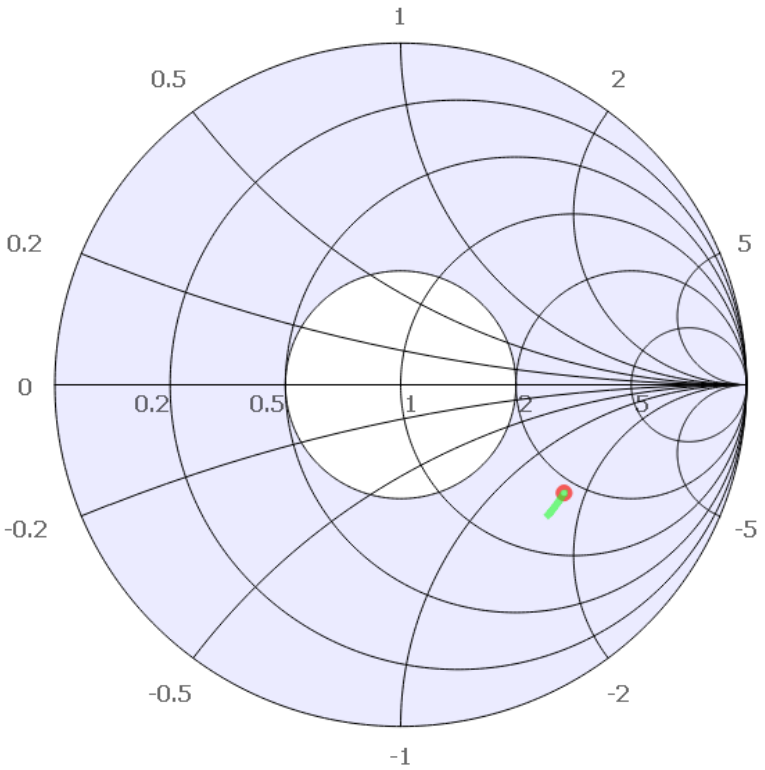
Smith-Diagramm aus VNA



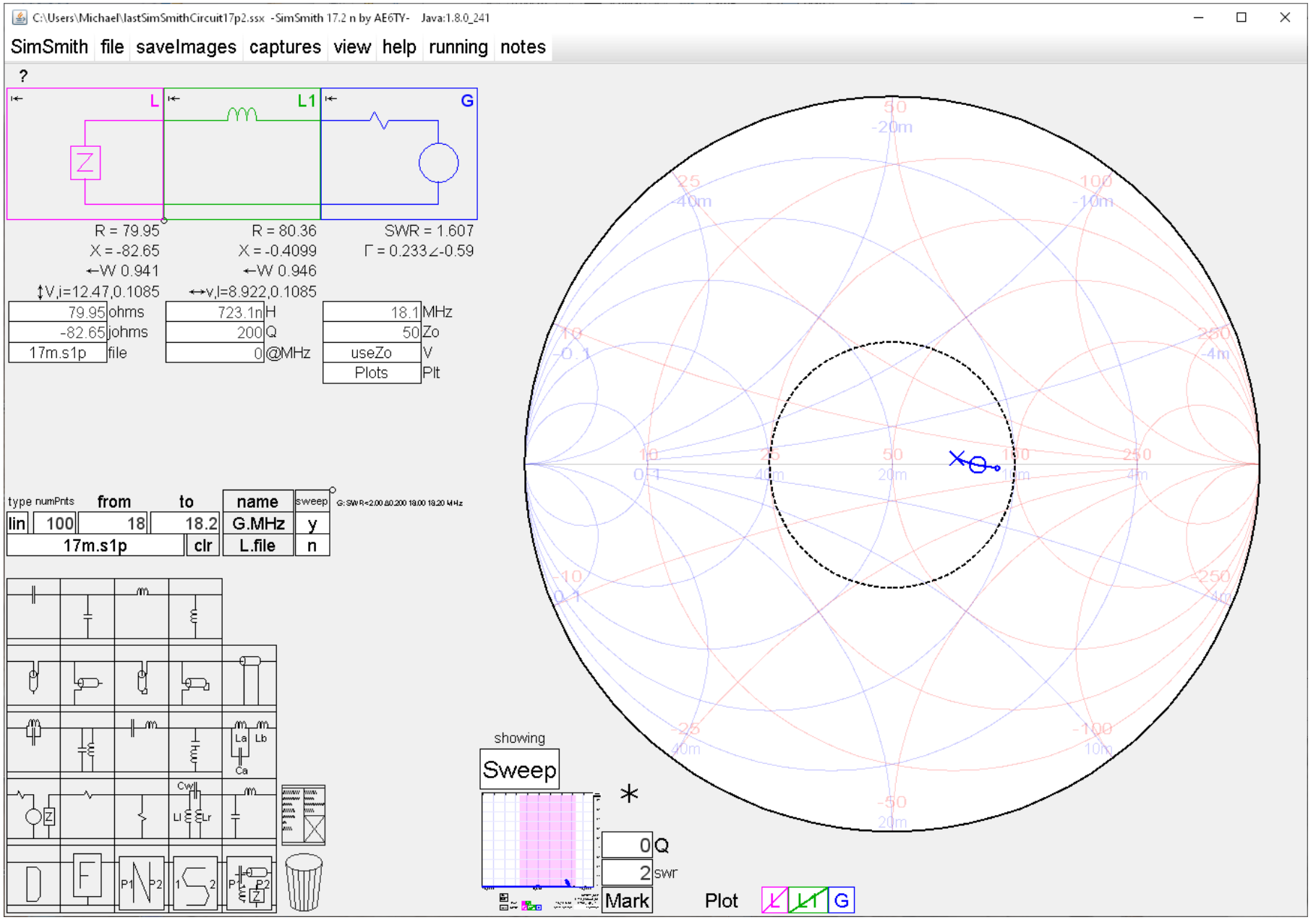
6-30 MHz

17m-Band

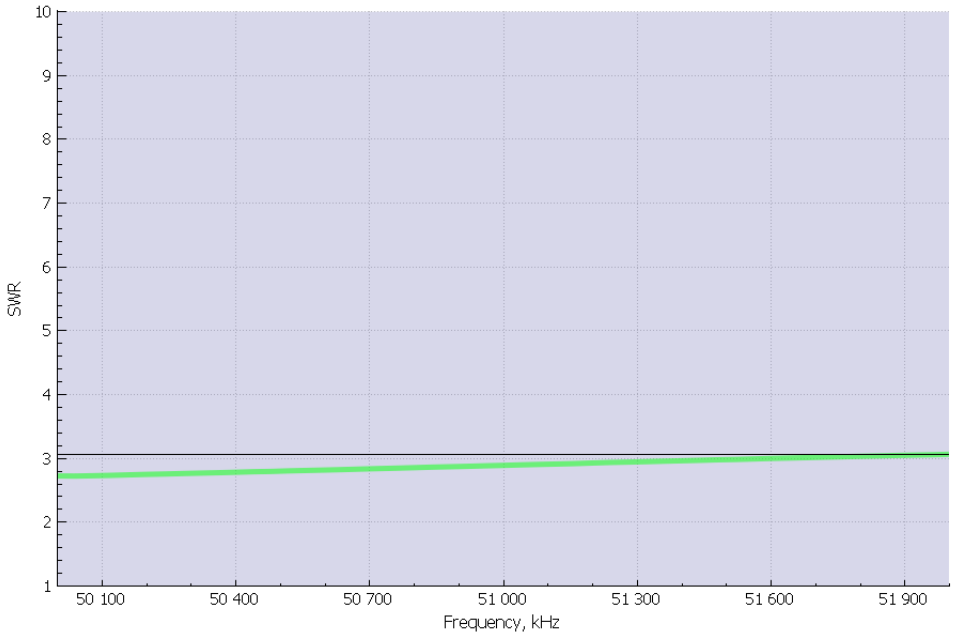

SWR
10
9
8
7
6
5
4
3
2
1
18 000
18 030
18 060
18 090
18 120
18 150
18 180
Frequency, kHz

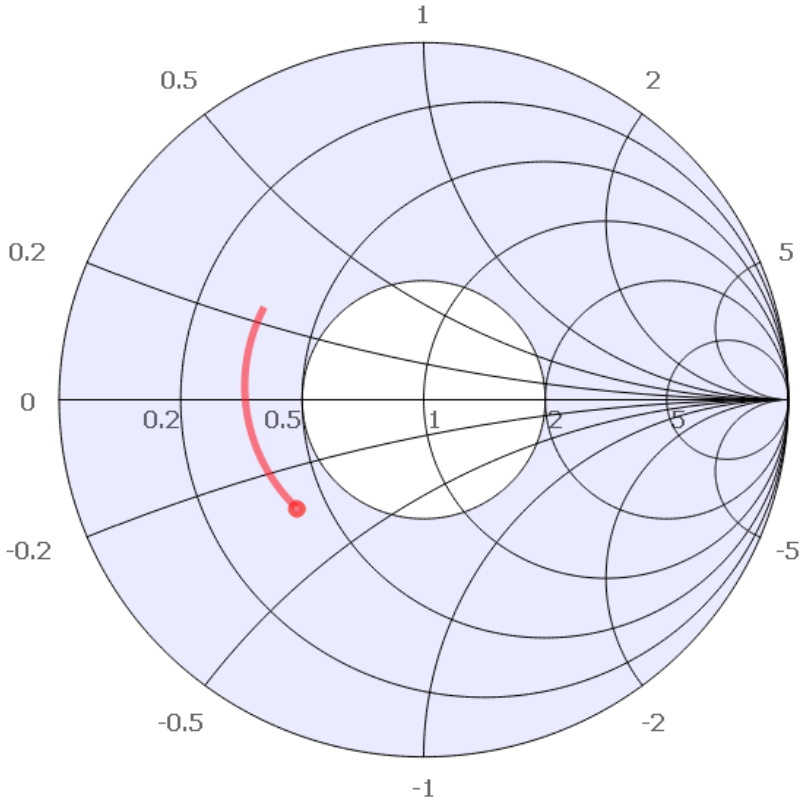

1
0.5
2
0.2
5
0
0.2
0.5
1
2
5
-0.2
-5
-0.5
-2
-1

17m-Band Anpassen



6m-Band


SWR
10
9
8
7
6
5
4
3
2
1
50 100
50 400
50 700
51 000
51 300
51 600
51 900
Frequency, kHz


1
0.5
2
0.2
5
0
0.2
0.5
1
2
5
-0.2
-5
-0.5
-2
-1

6m-Band anpassen