

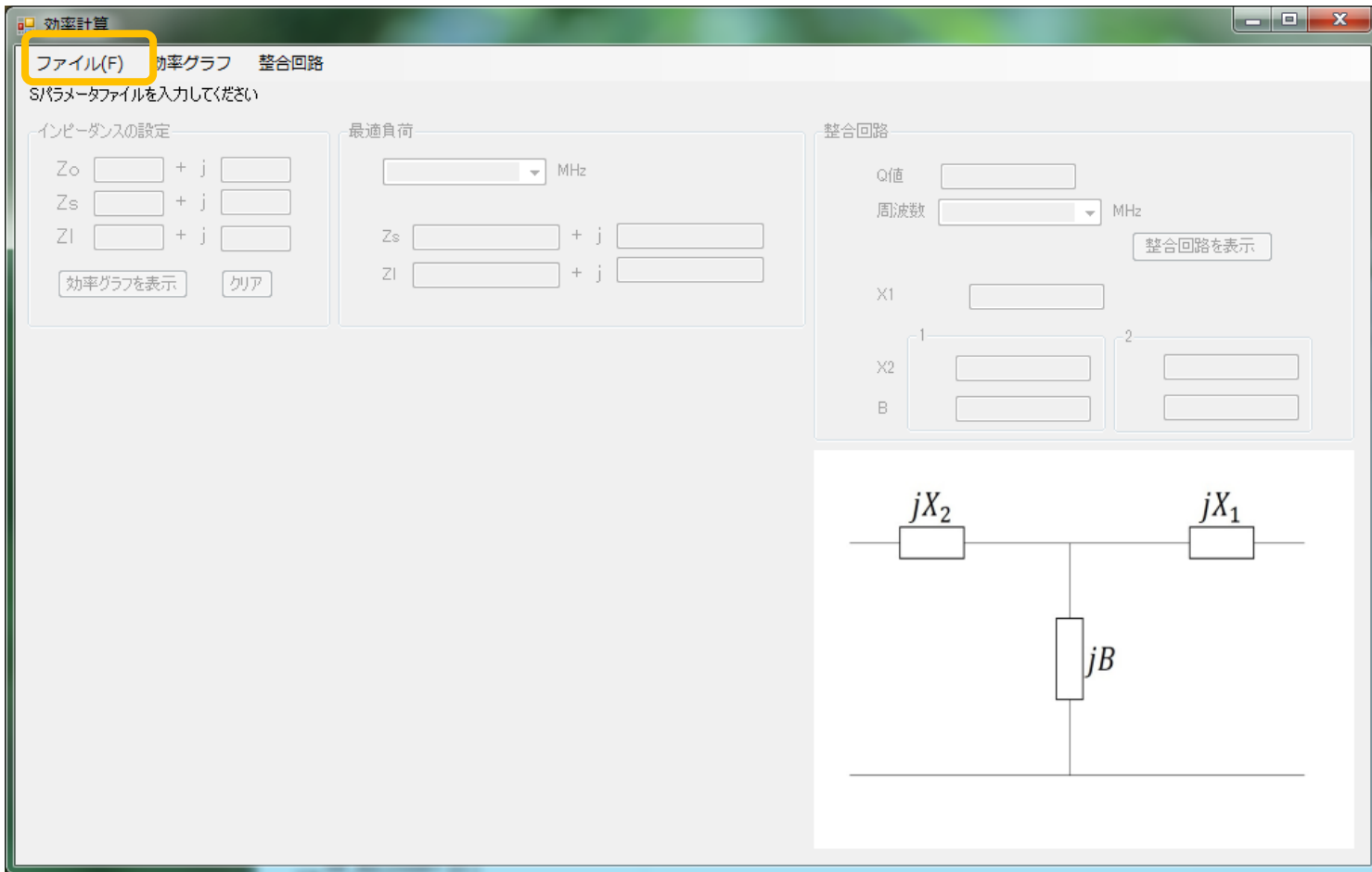
Sパラメターから

任意負荷の効率及び最大効率の計算

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# sパラメータ

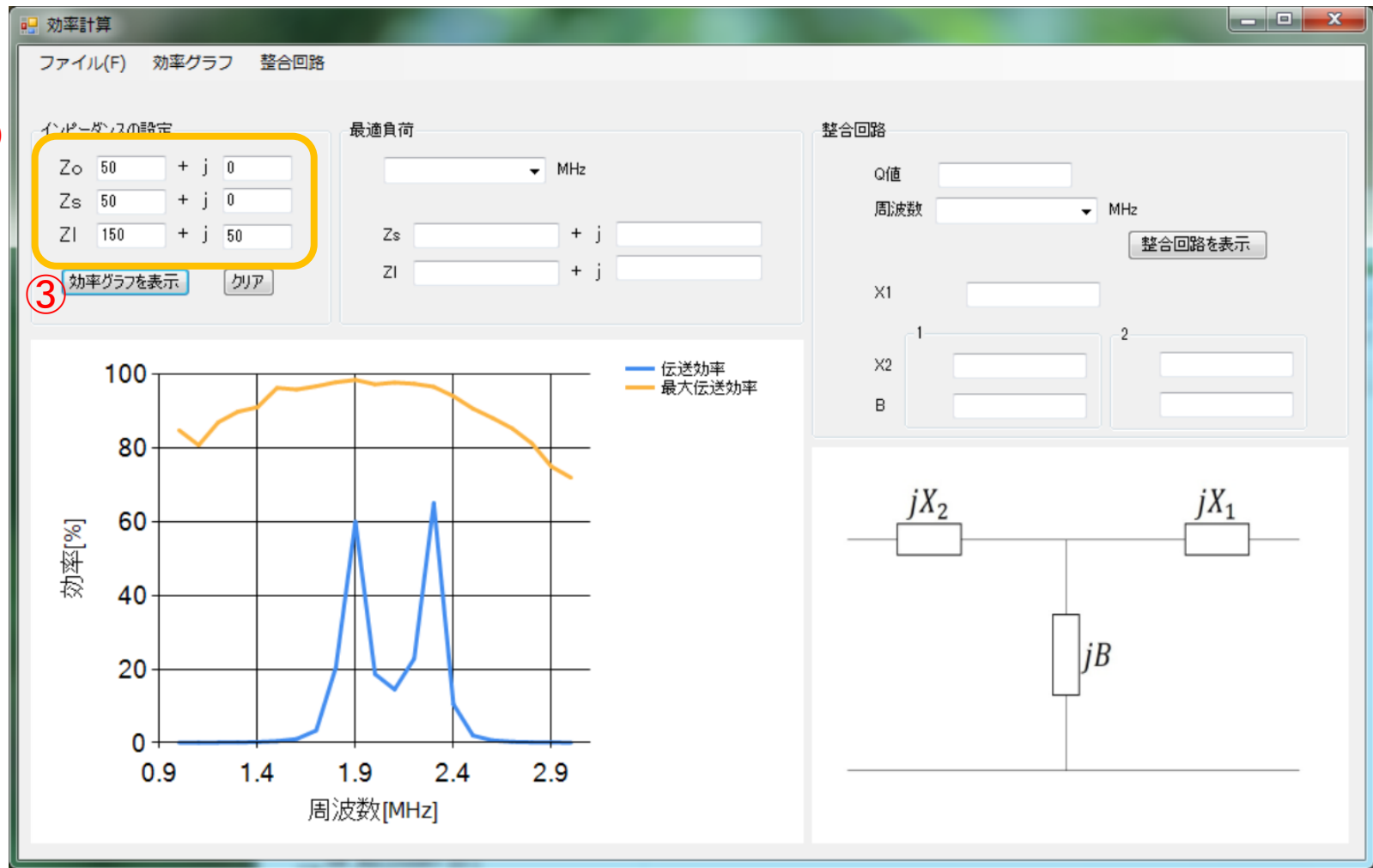
①



① sパラメータデータファイルを開く。

ファイルの書式は下記通りです。

周波数 |s11| (真値) <S11 (角度Deg) |s12| <S12 |s21| <S21 |s122| <S22



- ② 特性インピーダンス設定, 源側と負荷側インピーダンス設定
- ③ 効率グラフを表示で計算が終了.

効率はデータファイルでの出力も可能です.

# Sパラメータから最大効率計算式

## 最大効率

$$\eta_{\max} = \frac{P_2}{P_1} = \frac{|b_2|^2 - |a_2|^2}{|a_1|^2 - |b_1|^2} = \frac{\left(1 - |\Gamma_l^{opt}|^2\right) |s_{21}|^2}{\left|1 - s_{22}\Gamma_l^{opt}\right|^2 - \left|s_{11} - \Delta\Gamma_l^{opt}\right|^2}$$

## 最適インピーダンス

$$\Gamma_s^{opt} = \frac{B_1 \pm \sqrt{B_1^2 - 4|C_1|^2}}{2C_1}$$
$$\Gamma_l^{opt} = \frac{B_2 \pm \sqrt{B_2^2 - 4|C_2|^2}}{2C_2}$$

where

$$B_1 = 1 + |s_{11}|^2 - |s_{22}|^2 - |\Delta|^2$$

$$B_2 = 1 + |s_{22}|^2 - |s_{11}|^2 - |\Delta|^2$$

$$C_1 = s_{11} - \Delta s_{22}^*$$

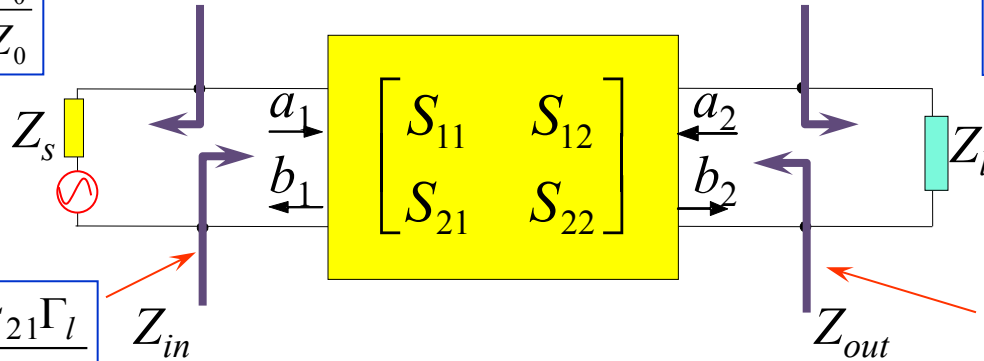
$$C_2 = s_{22} - \Delta s_{11}^*$$

$$\Delta = s_{11}s_{22} - s_{12}s_{21}$$

# 整合条件

$$\Gamma_s = \frac{Z_s - Z_0}{Z_s + Z_0}$$

$$\Gamma_l = \frac{Z_l - Z_0}{Z_l + Z_0}$$



$$\Gamma_{in} = s_{11} + \frac{s_{12}s_{21}\Gamma_l}{1 - s_{22}\Gamma_l}$$

$$\Gamma_{out} = s_{22} + \frac{s_{12}s_{21}\Gamma_s}{1 - s_{11}\Gamma_s}$$

## Conjugated matching condition

$$Z_s = Z_{in}^*$$

$$Z_l = Z_{out}^*$$

## Conjugated matching condition

$$\Gamma_s = \Gamma_{in}^*$$

$$\Gamma_l = \Gamma_{out}^*$$

## 参考文献

- [1] Q. Yuan, Q. Chen, and K. Sawaya, "Numerical Analysis on Transmission Efficiency of Evanescent Resonant Coupling Wireless Power Transfer System," IEEE Transactions on Antennas and Propagation, vol. 58, no. 5, pp. 1751 - 1758, May 2010.
- [2] Qiang Chen, Kazuhiro Ozawa, Qiaowei Yuan, and Kunio Sawaya, "Antenna Characterization for Wireless Power-Transmission System Using Near-Field Coupling," IEEE Antennas Propag. Mag., vol. 54, no. 4, pp. 108-116, Aug. 2012.
- [3] [http://link.springer.com/referenceworkentry/10.1007/978-981-4560-75-7\\_91-1](http://link.springer.com/referenceworkentry/10.1007/978-981-4560-75-7_91-1)