Determine the coupling strength in level attraction

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Jun 10th, 2019

Determine the coupling strength without ω_s mapping

Line shape of spectrum:

$$S_{21} = 1 + \frac{\kappa_{\text{ext}}}{i(\omega - \omega_c) - (\gamma_c + \kappa_{\text{ext}}) + \frac{g^2}{i(\omega - \omega_s) - \gamma_s}}$$

Parameters we set fixed

$\gamma_{cvity} = 10.9$ MHz $\pm$ 0.5MHz

$\kappa_{ext} = 754$ MHz $\pm$ 8MHz

$\omega_{cavity} \approx 2.33$ GHz (influenced by dielectric material)

$\gamma_{ssr} = 3.0$ MHz $\pm$ 0.2MHz ?

$\omega_{ssr} \approx 2.41$ GHz (influenced by dielectric material)

Extrinsic damping of SRR

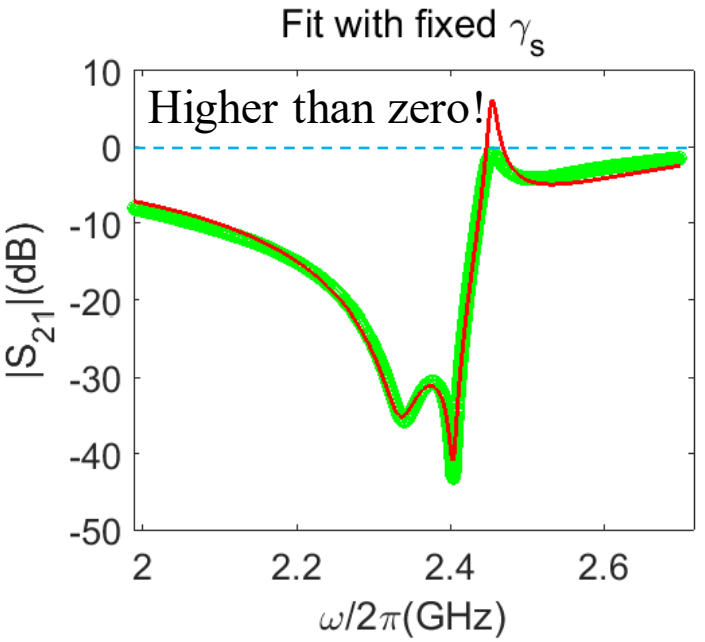
$\kappa_{ssr} = 15.9$ MHz $\pm$ 0.1MHz

Parameters we need to fit:

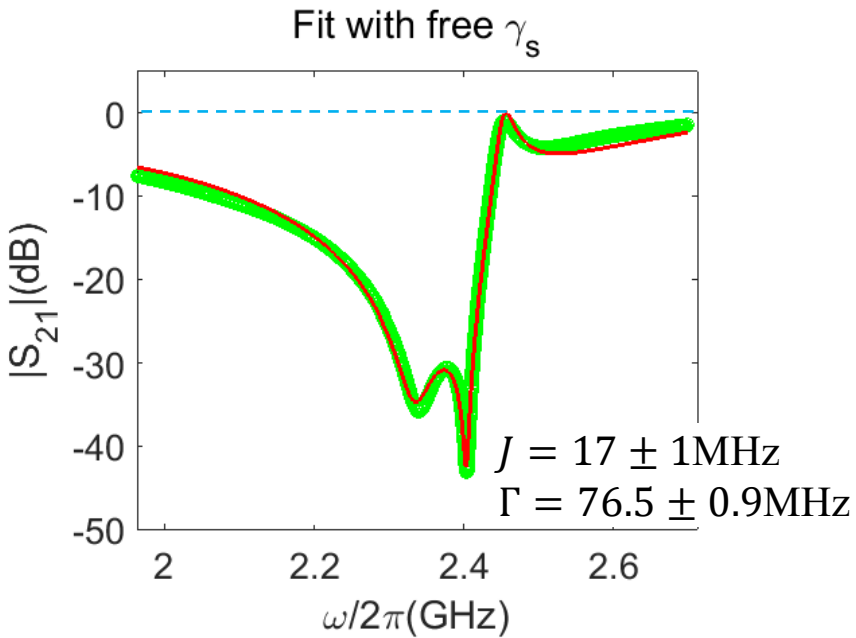
$$g = J + i\Gamma$$

Γ start point : ~ 70 MHz (estimated)

J start point : ~ 10 MHz (estimated)



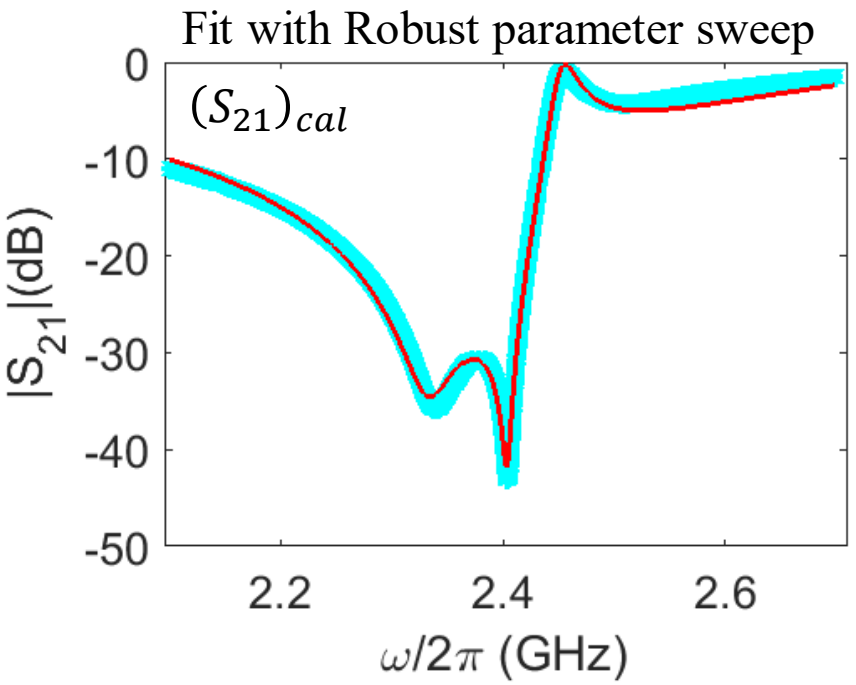
$\gamma_{ssr} = 19.0$ MHz $\pm$ 0.1 MHz

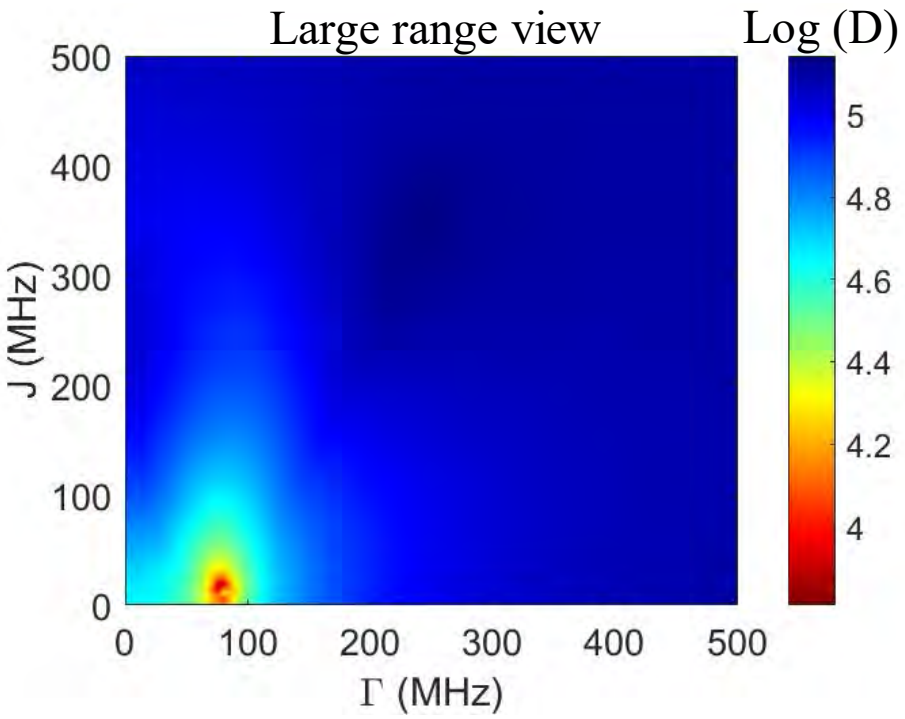


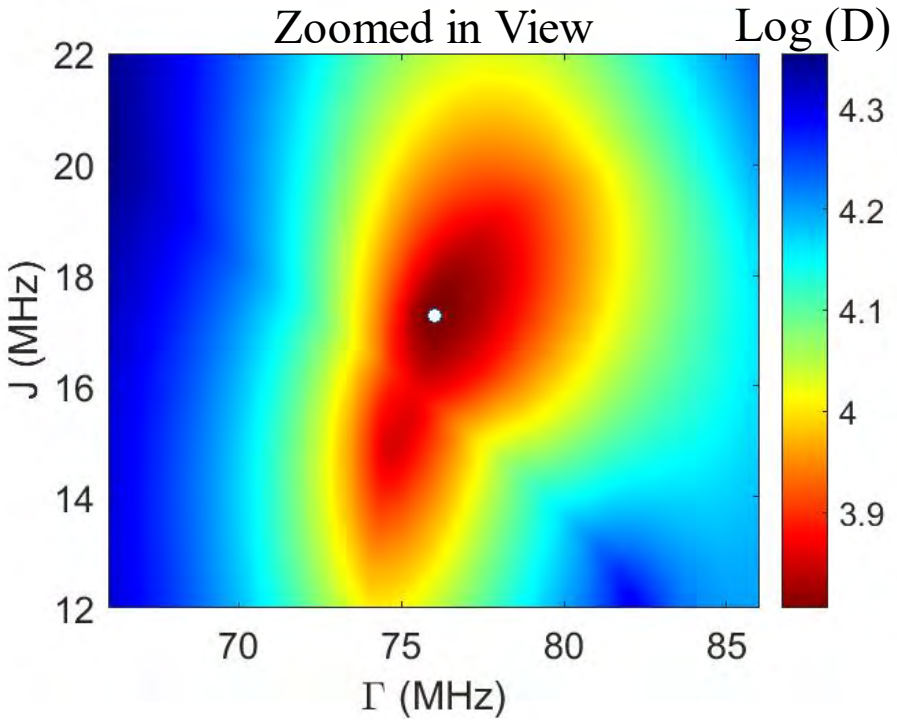
Solution space

Is this the only solution for J and Γ ?

$$D(J,\Gamma) = \sum[|(S_{21})_{cal}(J,\Gamma) - (S_{21})_{mea}|]$$



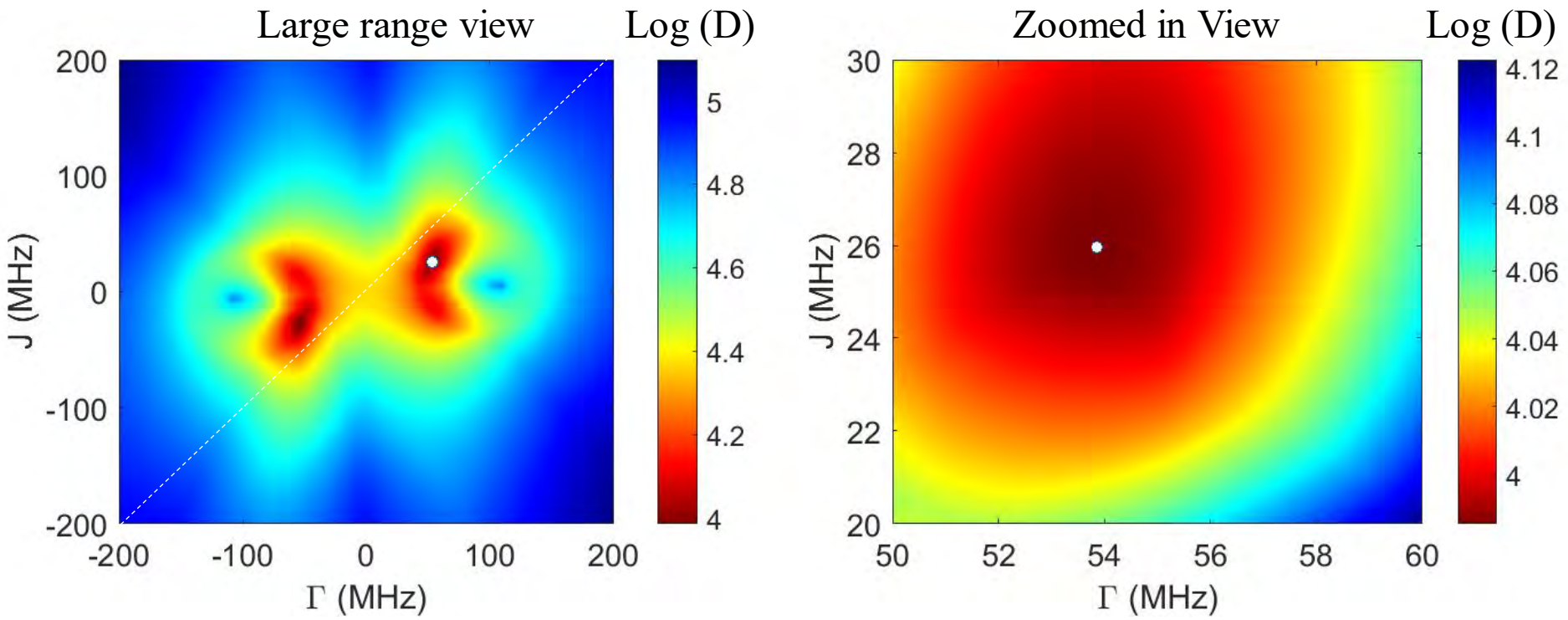




J = 17.23 MHz
Γ = 76.06 MHz

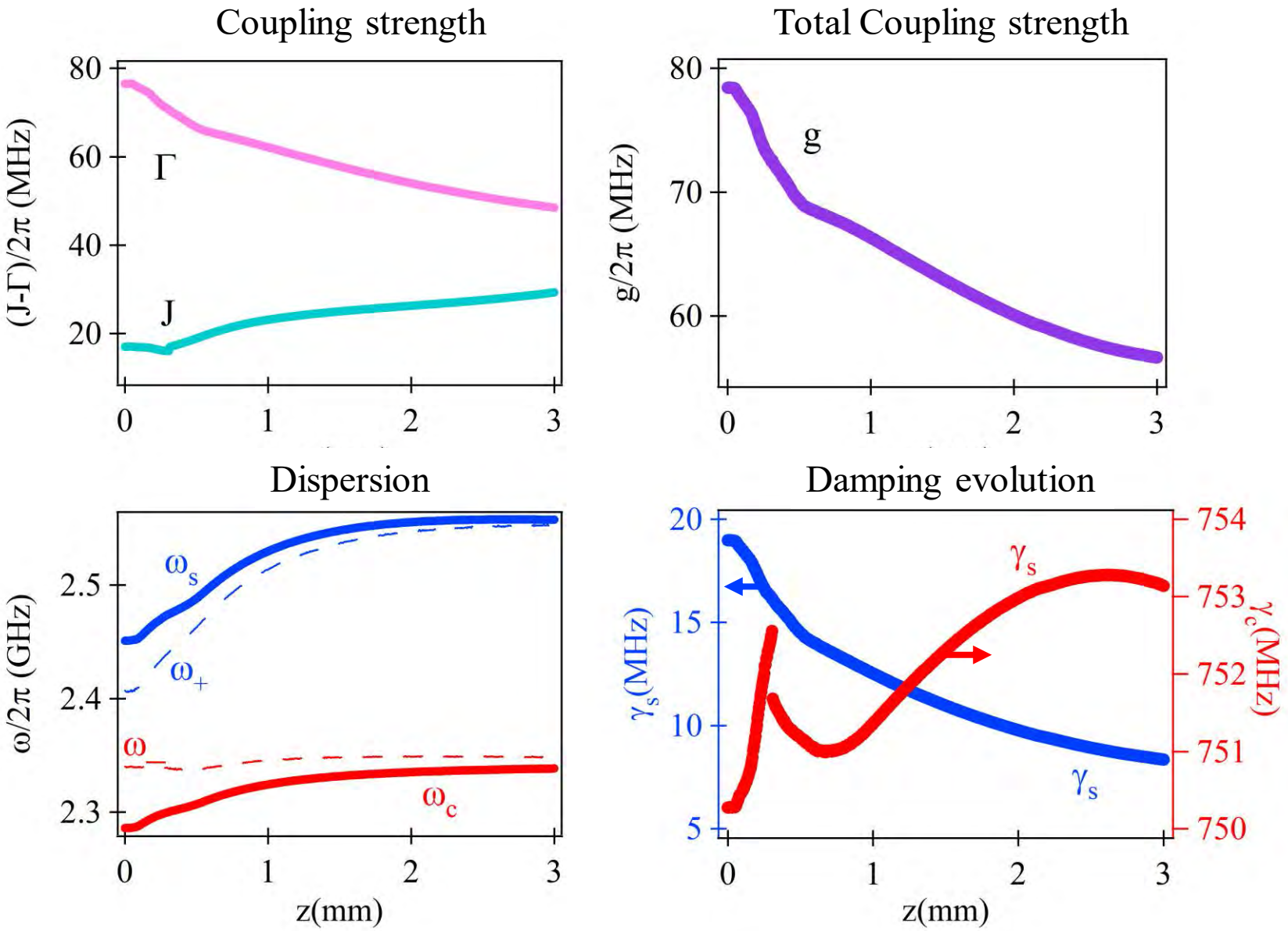
From curve fitting:
$J = 17 \pm 1$MHz
$\Gamma = 76.5 \pm 0.9$MHz

Further check: if J and Γ not always greater than zero

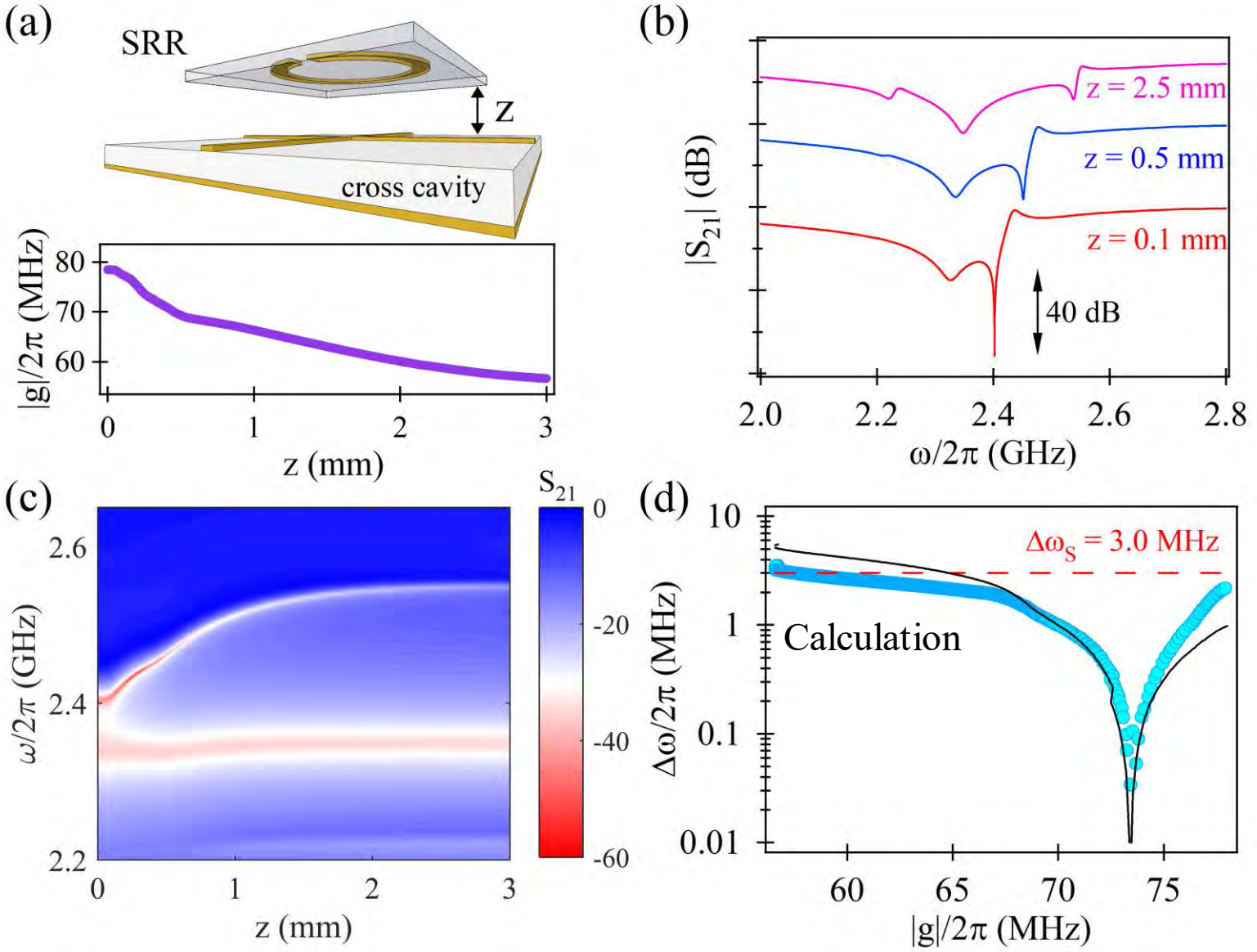


→ There is only one set of the solution of J and Γ !

Fitting Results



Modified Fig. 2



Alternatively