Solitons

Meeting 2022-01-24 3pm

Progress

- Analytic:
  - Cleaned up the process for calculating the coefficients
  - Plotted on a log scale (?) and compared to the numerical data
- Numeric:
  - Plotted the output frequency shift as a function of applied shifts and at different output coupling percentages

Analytic

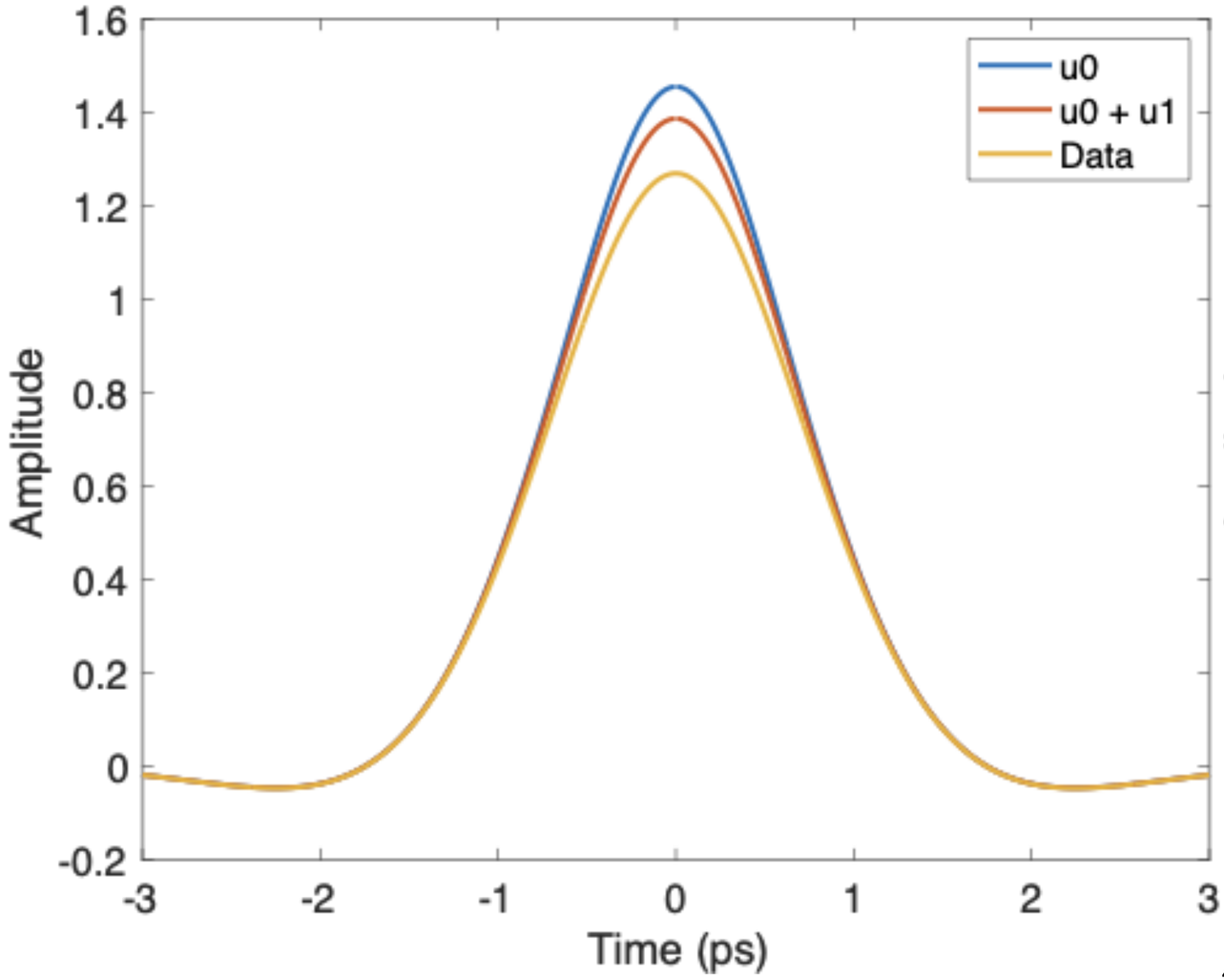
$$\begin{pmatrix} 3A^2B\Gamma + 72c(0)\sigma^4 - 232c(1)\sigma^4 + 24c(2)\sigma^4 + 264c(3)\sigma^4 \\ -3A^2B\Gamma + B^3\Gamma + 320c(1)\sigma^4 - 320c(3)\sigma^4 \\ 3AB^2\Gamma + 264c(0)\sigma^4 - 24c(1)\sigma^4 - 232c(2)\sigma^4 - 72c(3)\sigma^4 \\ A^3\Gamma - 3AB^2\Gamma - 320c(0)\sigma^4 + 320c(2)\sigma^4 \end{pmatrix}$$

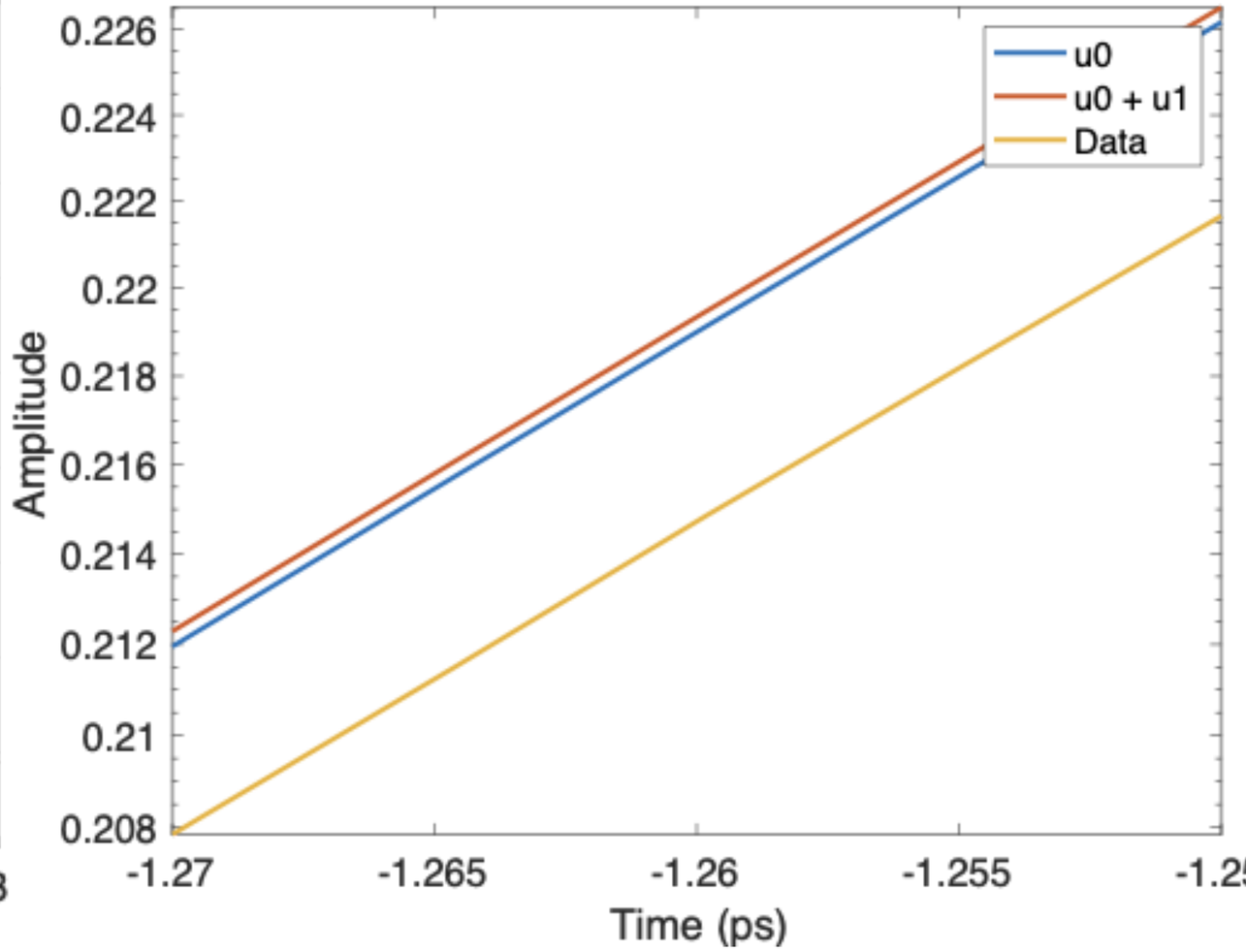
Solving these equations, we get

$$\begin{aligned} c_0 &= -\left(2A^3 + 9A^2B + 6AB^2 + 9B^3\right)\varphi \\ c_1 &= 3\left(3A^3 + 2A^2B + 3AB^2 - 2B^3\right)\varphi \\ c_2 &= -3\left(2A^3 + 3A^2B - 2AB^2 + 3B^3\right)\varphi \\ c_3 &= \left(9A^3 - 6A^2B + 9AB^2 - 2B^3\right)\varphi \end{aligned}, \qquad \varphi := \frac{\Gamma}{1280\sigma^4}$$

Analytic

$$c_0 = -0.0441097,\ c_1 = 0.000935146$$
$$c_2 = -0.0281592,\ c_3 = 0.00488343$$





Numeric

"OC: 0.3" or "30% energy feedback per trip" means that 30% of the energy returns to the loop after each round trip, 70% exits via the output coupler