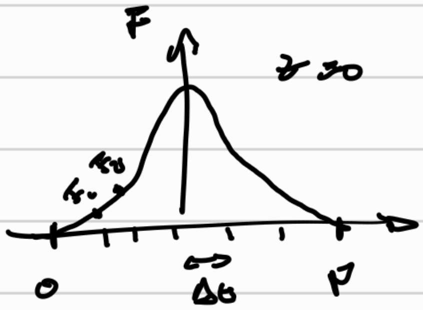
Weekly objective $\quad i\partial_\xi F = \underbrace{-i\beta_1\partial_\tau F}_{\text{Brownie points}} + \frac{\beta_2}{2}\partial_\tau^2 F$

$U_F = F$

reformulating notat° according to solitons paper

$$i\partial_z F_f + \left(i\bar{\beta}_f^{(1)}\partial_\tau - \frac{1}{2}\beta_f^{(2)}\partial_\tau^2\right)F_f + \gamma F_f^*(F_{s1} + \alpha F_{s2}) = 0,$$
$$i\partial_z F_{s1} + (\kappa - i\bar{\beta}_s^{(1)}\partial_\tau)F_{s1} + CF_{s2} + \frac{\gamma}{2}F_f^2 = 0,$$
$$i\partial_z F_{s2} + (\kappa + i\bar{\beta}_s^{(1)}\partial_\tau)F_{s2} + CF_{s1} + \frac{\gamma\alpha}{2}F_f^2 = 0, \quad (5)$$

$F(\xi, \tau)$ for $i\partial_\xi F = \frac{\beta_2}{2}\partial_\tau^2 F \underbrace{-i\beta_1\partial_\tau F}_{\text{"mobility"}}$



BC = 0

Solving tech

$\boxed{\text{FDM}}$ $\quad$ $\boxed{\text{Basis set}}$ ~ Spectral

$$i\partial_\xi F_j = -\frac{r_2}{\Delta t^2}(F_{j+1} + F_{j-1} - 2F_j)$$

$$F_\xi = \sum c_n(\xi)\, e^{-in\omega_0\tau}$$

choose-tech

FFT
IFFT

$$\omega_0 = \frac{2\pi}{N\cdot\Delta t}$$

$$i\partial_\xi c_n = \frac{\beta_2}{2}(-n\omega_0)^2 c_n$$

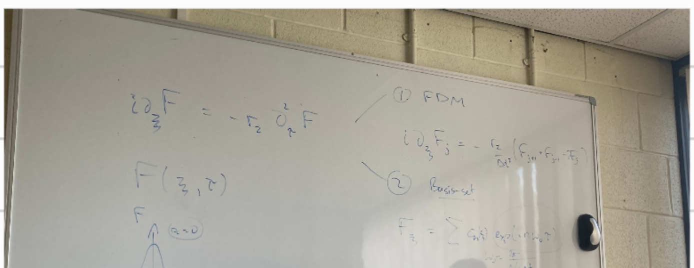
$$c_n(\xi) = c_n(0)\, e^{-i\underbrace{\frac{\beta_2}{2}n^2\omega_0^2}_{k}\xi}$$

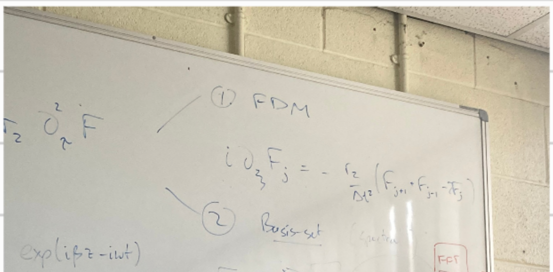
$$k = \frac{\beta_2}{2}\omega^2$$

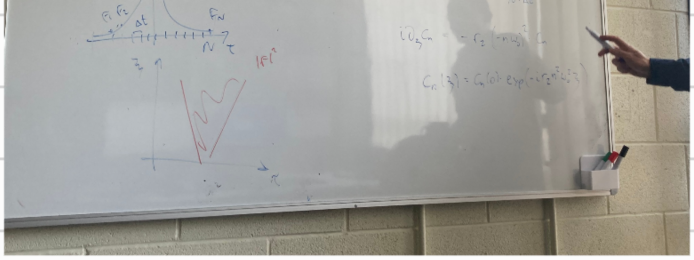
$$\frac{1}{V_0} = \frac{\partial k}{\partial \omega} = \beta_2\omega$$

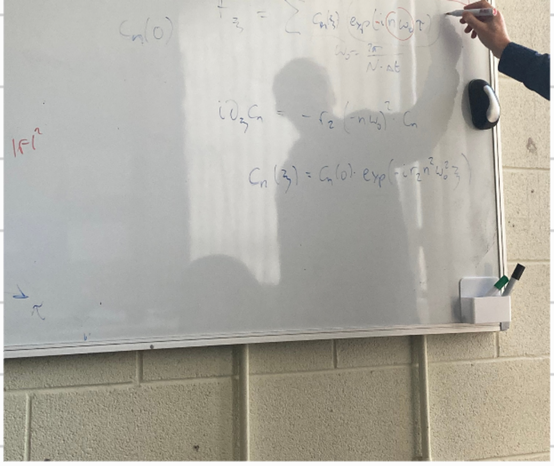
$$V_g = \frac{\partial \omega}{\partial k}$$

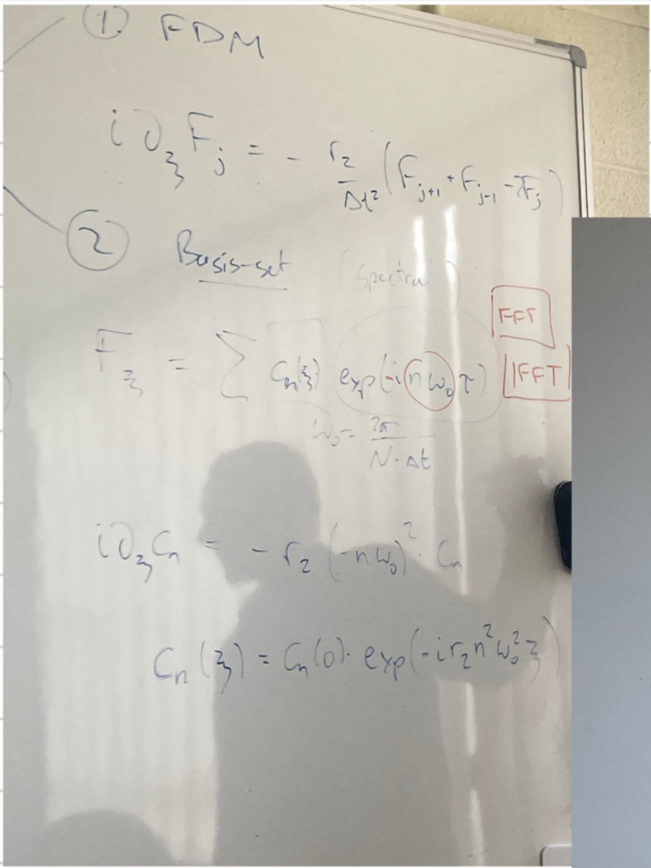
$$\beta_2 = \frac{\partial^2\beta}{\partial\omega} \quad \text{as} \quad \beta(\omega) \approx \beta_0 + \beta_1\omega + \frac{\beta_2}{2}\omega^2 + \dots$$



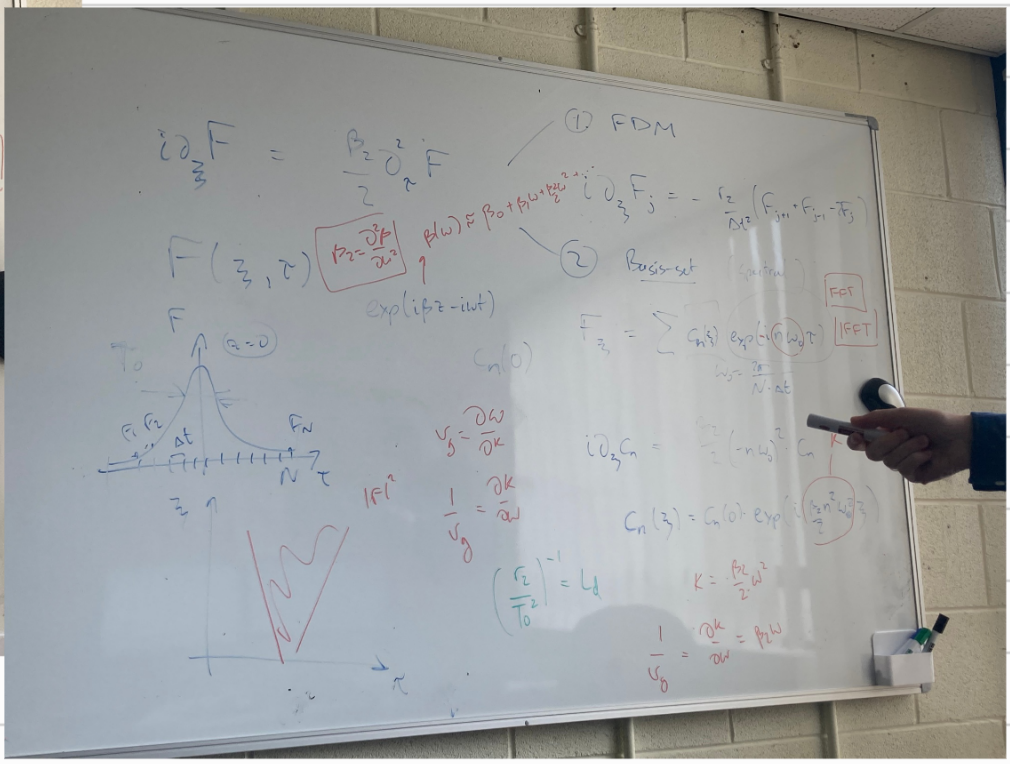




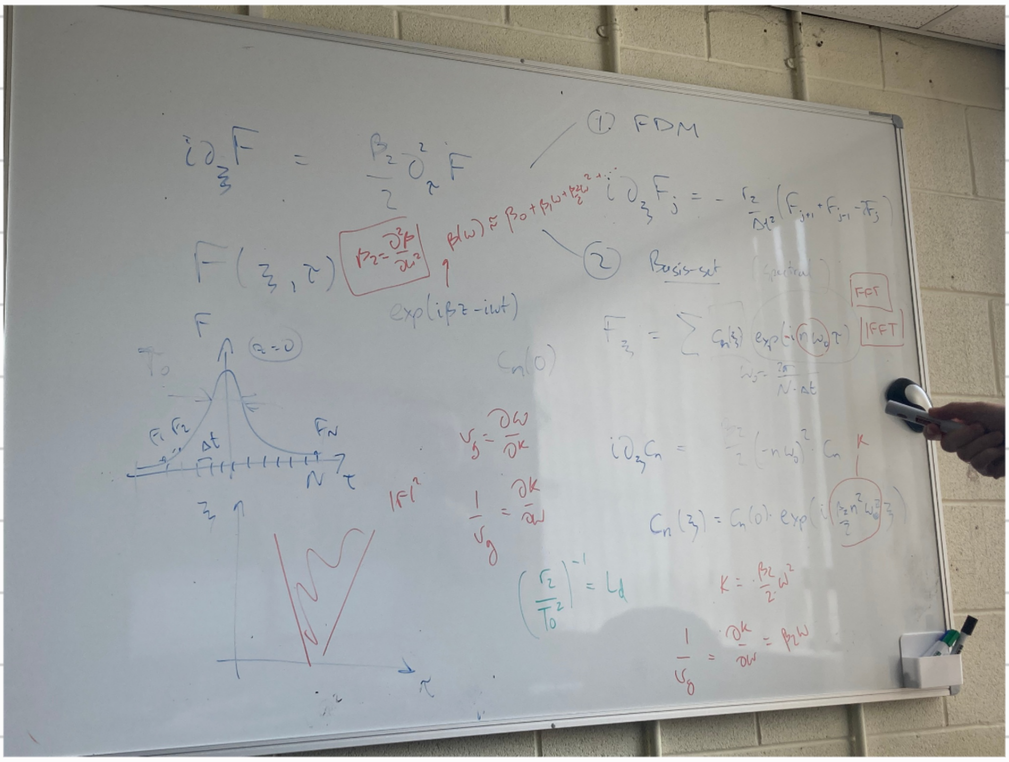




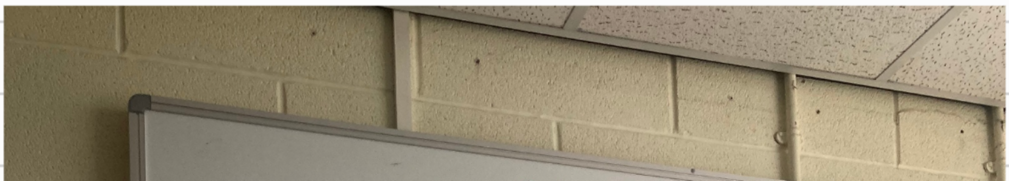
1. FDM
2. Basis-set
Spectral
FFT
IFFT

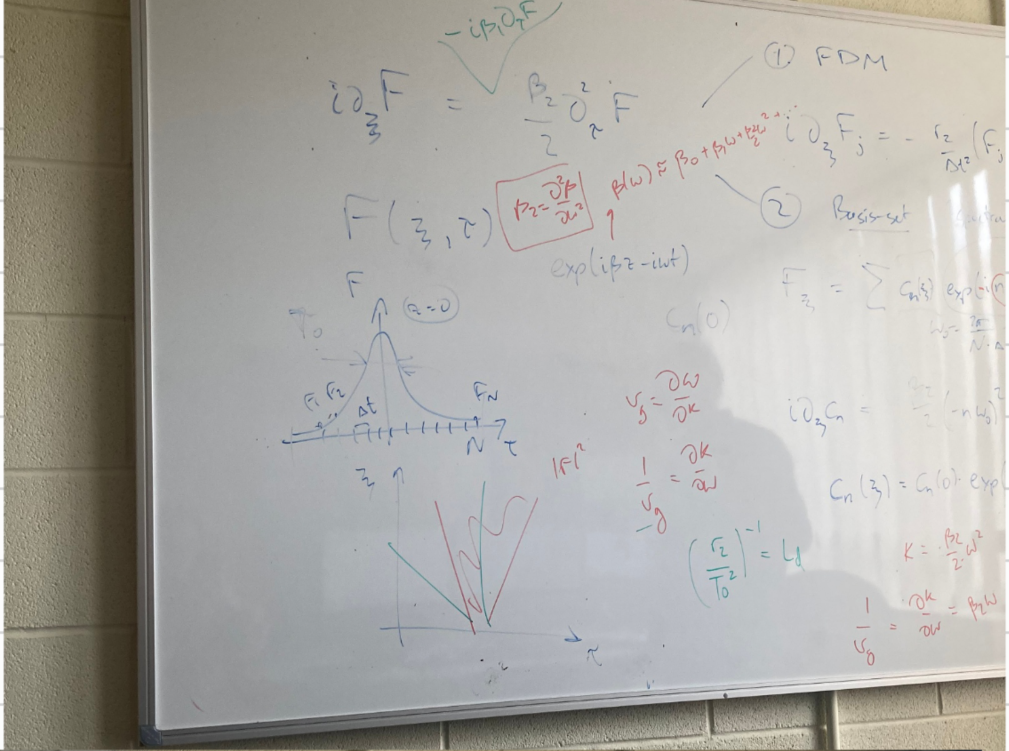


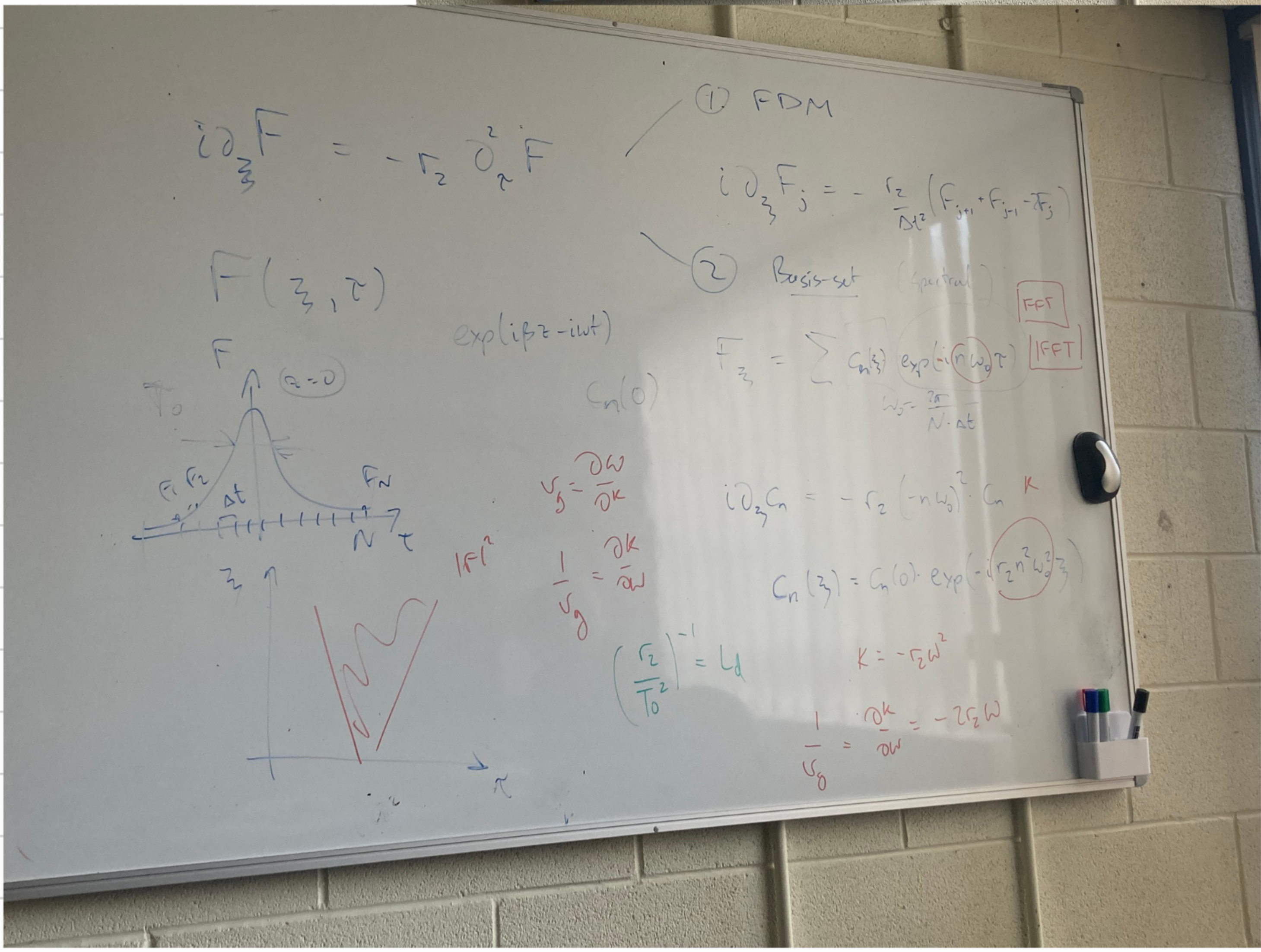
1. FDM
2. Basis-set
Spectral
FFT
IFFT
exp(iβz - iωt)



1. FDM
2. Basis-set
Spectral
FFT
IFFT
exp(iβz - iωt)




$-i\beta_1\partial_\tau F$
$i\partial_\xi F = \frac{\beta_2}{2}\partial_\tau^2 F$
① FDM
$\beta(\omega) \approx \beta_0 + \beta_1\omega + \frac{\beta_2\omega^2}{2} + \dots$
$F(\xi, \tau)$
$\boxed{\beta_2 = \frac{\partial^2\beta}{\partial\omega^2}}$
② Basis-set
$\exp(i\beta z - i\omega t)$
$C_n(0)$
$v_g = \frac{\partial\omega}{\partial k}$
$\frac{1}{v_g} = \frac{\partial k}{\partial\omega}$
$|F|^2$
$\left(\frac{r_2}{T_0^2}\right)^{-1} = L_d$
$K = \frac{\beta_2}{2}\omega^2$
$\frac{1}{v_g} = \frac{\partial k}{\partial\omega} = \beta_2\omega$


$i\partial_\xi F = -r_2\partial_\tau^2 F$
① FDM
$i\partial_\xi F_j = -\frac{r_2}{\Delta t^2}(F_{j+1} + F_{j-1} - 2F_j)$
$F(\xi, \tau)$
② Basis-set (spectral)
$\exp(i\beta z - i\omega t)$
FFT
IFFT
$F_\xi = \sum C_n(\xi)\exp(-i n\omega_0\tau)$
$\omega_0 = \frac{2\pi}{N\cdot\Delta t}$
$C_n(0)$
T_0
$(z=0)$
F_1 F_2
Δt
F_N
N τ
ξ
$v_g = \frac{\partial\omega}{\partial k}$
$\frac{1}{v_g} = \frac{\partial k}{\partial\omega}$
$|F|^2$
$i\partial_\xi C_n = -r_2(-n\omega_0)^2 C_n$ K
$C_n(\xi) = C_n(0)\cdot\exp(-i r_2 n^2\omega_0^2\xi)$
$\left(\frac{r_2}{T_0^2}\right)^{-1} = L_d$
$K = -r_2\omega^2$
$\frac{1}{v_g} = \frac{\partial k}{\partial\omega} = -2r_2\omega$