

Second order non-hom. ODE

Variation of parameters

$$y'' + p y' + q y = r$$

Asso. homogeneous ODE has sol<sup>r</sup>  $y_1, y_2$  (l. ind.)

$$y_p = v_1 y_1 + v_2 y_2$$

$$y_p' = v_1 y_1' + v_2 y_2'$$

$$y_p''$$

$$\boxed{v_1' y_1 + v_2' y_2 = 0}$$

$$v_1' y_1' + v_2' y_2' = r$$

$$Y(\zeta) = v_1(\zeta) y_1(\zeta)$$

$$+ v_2(\zeta) y_2(\zeta)$$

$$y_p(\zeta) = Y(\zeta)$$

$$y_p'(\zeta) = \frac{\partial Y}{\partial n}(n, \zeta) \Big|_{n=\zeta}$$

$$n = \zeta_1$$

$$y_p(n) = v_1(n) y_1(n) + v_2(n) y_2(n)$$

$$Y(n, \zeta) = v_1(\zeta) y_1(n) + v_2(\zeta) y_2(n)$$

$$v_1'(\zeta) y_1(\zeta) + v_2'(\zeta) y_2(\zeta) = 0$$

$$\begin{aligned} y_p' &= v_1' y_1 + v_2' y_2 \\ &+ v_1 y_1' + v_2 y_2' \\ y'_s(n) &= v_1(\zeta) y_1'(\zeta) \\ &+ v_2(\zeta) y_2'(\zeta) \end{aligned}$$

envelope







