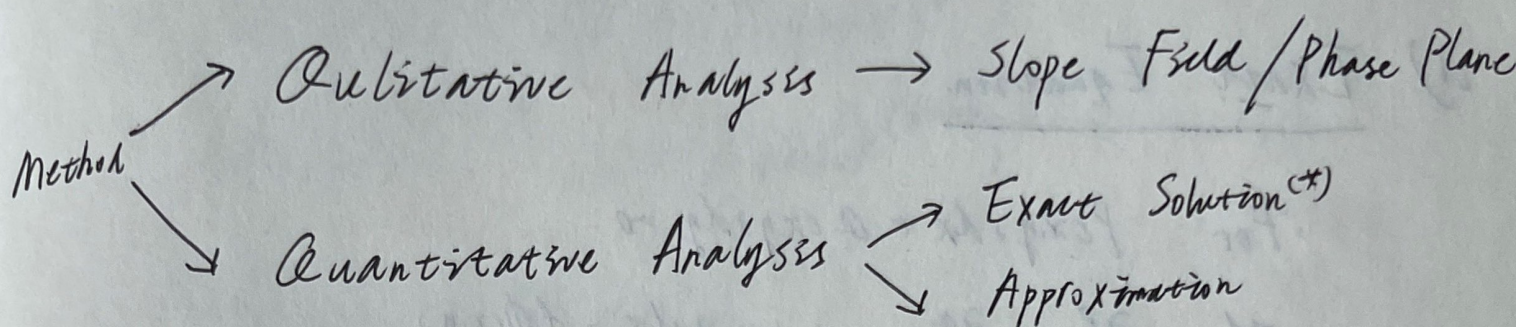


ODE



(*) : The solution may be local :

By : $\varphi(x, c_1, \dots, c_n) = \varphi$

$$\Rightarrow \begin{cases} \varphi(x, c_1, \dots, c_n) = \varphi \\ \varphi^{(1)}(x, c_1, \dots, c_n) = \varphi^{(1)} \\ \vdots \\ \varphi^{(n)}(x, c_1, \dots, c_n) = \varphi^{(n)} \end{cases} \quad \text{If } \frac{D(\varphi, \dots, \varphi^{(n)})}{D(c_1, \dots, c_n)} = \left| \left(\frac{\partial \varphi^{(i)}}{\partial c_j} \right)_{n \times n} \right| \neq 0$$

By Implicit Function Thm :

We can obtain :
$$\begin{cases} c_1 = c_1(x, \varphi, \dots, \varphi_n) \\ \vdots \\ c_n = c_n(x, \varphi, \dots, \varphi_n) \end{cases} \quad \text{where } \varphi_i = \varphi^{(i)} \text{ locally.}$$

\Rightarrow Then $\varphi(x, c_1, c_2, \dots, c_n)$ is the exact solution

of $\varphi^{(i)}(x, c_1(x, \varphi, \dots, \varphi_n), c_2(x), \dots, c_n(x)) = \varphi^{(i)}$

$$0 \leq i \leq n$$