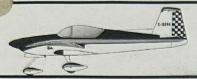
NOM: _____ GROUPE: _____ DATE: _____

NUMÉRO DU COURS: _____ PROFESSEUR: _____

SUJET: _____ ÉQUIPE: _____ AVION: _____ PAGE: ____ DE ____



TECHNIQUES DE GÉNIE AÉROSPATIAL

ÉNA ÉCOLE NATIONALE D'AÉROTECHNIQUE

o régime permanent

$$\frac{\partial c}{\partial t} = D_{eff}\nabla^2 C - S$$

$$0 = D_{eff}\nabla^2 C - S$$

$$\frac{S}{D_{eff}} = \nabla^2 C$$ en coordonnées cylindrique et discrétisée (axisymmétrique)

$$\frac{S}{D_{eff}} = \frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial C}{\partial r}\right)$$

$$\frac{S}{D_{eff}} = \frac{1}{r}\left[\frac{\partial r}{\partial r}\left(\frac{\partial C}{\partial r}\right) + r\frac{\partial^2 C}{\partial r^2}\right]$$

ordre 1

$$\frac{S}{D_{eff}} = \frac{1}{r}\frac{\partial C}{\partial r} + \frac{\partial^2 C}{\partial r^2}$$

$$\frac{S}{D_{eff}} = \frac{1}{r_i}\left(\frac{C_{i+1} - C_i}{\Delta r}\right) + \frac{C_{i+1} - 2C_i + C_{i-1}}{\Delta r^2}$$

$$\frac{S}{D_{eff}} = \frac{1}{r_i \Delta r}\left(C_i + \Delta r\frac{\partial C}{\partial r} + \frac{\Delta r^2}{2}\frac{\partial^2 C}{\partial r^2} - C_i\right)$$

$$+ \left(\frac{1}{\Delta r^2}\right)\left(C_i + \Delta r\frac{\partial C}{\partial r} + \frac{\Delta r^2}{2}\frac{\partial^2 C}{\partial r^2} - 2C_i + C_i - \Delta r\frac{\partial C}{\partial r} + \frac{\Delta r^2}{2}\frac{\partial^2 C}{\partial r^2} \dots\right)$$

$$\frac{S}{D_{eff}} = \frac{1}{r\Delta r}\left(\Delta r\frac{\partial C}{\partial r} + \frac{\Delta r^2}{2}\frac{\partial^2 C}{\partial r^2} \dots\right)$$

$$+ \frac{1}{\Delta r^2}\left(\Delta r^2\frac{\partial^2 C}{\partial r^2} + \frac{2\Delta r^4}{4!}\frac{\partial^4 C}{\partial r^4} \dots\right)$$

$$\frac{S}{D_{eff}} = \frac{1}{r}\left(\frac{\Delta r}{2}\frac{\partial^2 C}{\partial r^2} + \frac{\partial C}{\partial r}\right) + \left(\frac{\partial^2 C}{\partial r^2} + \frac{\Delta r^2}{12}\frac{\partial^4 C}{\partial r^4} \dots\right)$$

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