The equations for parallel transport along a latitude line:

$$\frac{dA^\varphi}{d\varphi} + \frac{1}{r}A^r + Cot\theta\, A^\theta = 0$$

$$\frac{dA^\theta}{d\varphi} - \sin\theta\,\cos\theta\, A^\varphi = 0$$

$$\frac{dA^r}{d\varphi} - r\sin^2\theta\, A^\varphi = 0$$

Solutions:

$$A^\varphi = C_1 Cos\varphi + C_2 Sin\varphi$$

$$A^\theta = Sin\theta\, Cos\theta\,[C_1 Sin\varphi - C_2 Cos\varphi] + C_3$$

$$A^r = rSin^2\theta\,[C_1 Sin\varphi - C_2 Cos\varphi] - C_3$$

They are periodic functions of 2π 2π