算法 1: 基于递推对平行于等深线的情况求解最少总路线数量

Input: θ, α, D_{mid}

θ表示多波束换能器的开角

α表示坡度

D_{mid}表示海域中心点处的海水深度

Output: n, d

n最少总路线数量

矩阵d表示测量船距海域中心点处的距离(单位：米)

1 **begin**

// 算海域最深和最浅的深度

2 $D_{west} = D_{mid} - (-4/2 * 1852) \tan \alpha$

3 $WR_{west} = \frac{D_{west}}{\sin(\frac{\pi}{2}+\alpha-\frac{\theta}{2})} \sin \frac{\theta}{2}$

4 $D_1 = WR_{west} \frac{\sin(\frac{\pi}{2}-\alpha-\frac{\theta}{2})}{\sin \frac{\theta}{2}}$

5 $D_{east} = D_{mid} - (4/2 * 1852) \tan \alpha$

6 $WR_{east} = \frac{D_{east}}{\sin(\frac{\pi}{2}+\alpha-\frac{\theta}{2})} \sin \frac{\theta}{2}$

7 $D_n = WR_{east} \frac{\sin(\frac{\pi}{2}-\alpha-\frac{\theta}{2})}{\sin \frac{\theta}{2}}$

8 n = 0;

9 **while** *1* **do**

10 根据递推公式利用上一个航线求出下一个航线对应深度D_{next}

11 **if** $D_{next} < D_n$ **then**

12 break;

13 **end**

14 $WR_{next} = \frac{D_{next}}{\sin(\frac{\pi}{2}+\alpha-\frac{\theta}{2})} \sin \frac{\theta}{2}$

15 $WL_{next} = \frac{D_{next}}{\sin(\frac{\pi}{2}-\alpha-\frac{\theta}{2})} \sin \frac{\theta}{2}$

16 $W_{next} = WL_{next} + WR_{next}$

17 $d_{next} = \frac{D_{mid}-D_{next}}{\tan \alpha}$

$push(D_{next}, WR_{next}, WL_{next}, W_{next}, d_{next}) \rightarrow (D, WR, WL, W, d)$

18 n = n + 1

19 **end**

20 **return** n

21 **end**