Acceleration-Based In Situ Eddy Dissipation Rate Estimation with Flight Data

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This appendix shows the method of grid arrangement and further geometric parameters computation. The wing and horizontal tail on the right side are taken as an example, as shown in Figure A.

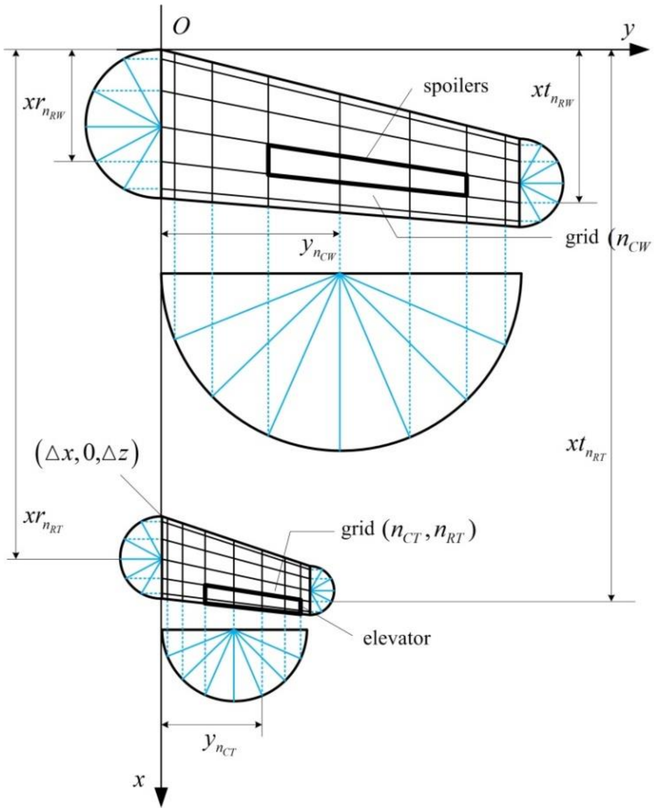

Figure S1. Grid distribution on wing and horizontal tail.

The *ith* grid number is defined as

$$i = N_{RW} \cdot (n_{CW} - 1) + n_{RW} \,. \tag{S1}$$

In Figure A, for $n_{RW}th$ and $n_{RW}th$-1 row, $xr_{n_{RW}}$ and $xt_{n_{RW}}$ represent the interception point on the root chord and tip chord respectively. $y_{n_{CW}}$ is the span length of the $n_{CW}th$ and $n_{CW}th$-1 grid boundary. The specific coordinate is described as

$$\begin{cases} xr_{n_{RW}} = \dfrac{c_r}{2} \cdot (1 - \cos \dfrac{n_{RW} - 1}{N_{RW}} \pi) \\ xt_{n_{RW}} = b_W \cdot \tan \Lambda_W + \dfrac{c_t}{2} \cdot (1 - \cos \dfrac{n_{RW} - 1}{N_{RW}} \pi) \\ y_{n_{CW}} = \dfrac{b_W}{2} \cdot (1 - \cos \dfrac{n_{CW} - 1}{N_{CW}} \pi) \end{cases} . \tag{S2}$$

As a result, the coordinate of the starting point of the ith grid, which locates in row n_{RW} and column n_{CW}, is $(y_{n_{CW}} \cdot \dfrac{xt_{n_{RW}} - xr_{n_{RW}}}{b_W} + x_{n_{RW}}, y_{n_{CW}}, y_{n_{CW}} \cdot \tan \Gamma_W)^T$. The coordinate of the end point of the ith grid is $(y_{n_{CW}+1} \cdot \dfrac{xt_{n_{RW}} - xr_{n_{RW}}}{b_W} + x_{n_{RW}}, y_{n_{CW+1}}, y_{n_{CW+1}} \cdot \tan \Gamma_W)^T$.

Accordingly, the coordinate position of the corresponded grid on the horizontal tail is calculated as follows

$$\begin{cases} xr_{n_{RT}} = \dfrac{c_{rT}}{2}\left(1-\cos\dfrac{n_{RT}-1}{N_{RT}}\pi\right)+\triangle x \\ xt_{n_{RT}} = b_T \cdot tg\Lambda_T + \dfrac{c_{tT}}{2}\left(1-\cos\dfrac{n_{RT}-1}{N_{RT}}\pi\right)+\triangle x \\ y_{n_{CT}} = \dfrac{b_T}{2}\left(1-\cos\dfrac{n_{CT}-1}{N_{CT}}\pi\right) \end{cases}. \tag{S3}$$

As a result, the coordinate of the starting point of the ith grid, which is located in row n_{RW} and column n_{CW}, is $(y_{n_{CT}} \cdot \frac{xt_{n_{RT}} - xr_{n_{RT}}}{b_T} + x_{n_{RT}}, y_{n_{CT}}, y_{n_{CT}} \cdot \tan\Gamma_T + \Delta z)^T$. The coordination of the end point of the ith grid is $(y_{n_{CT}+1} \cdot \frac{xt_{n_{RT}} - xr_{n_{RT}}}{b_T} + x_{n_{RT}}, y_{n_{CT+1}}, y_{n_{CT+1}} \cdot \tan\Gamma_T + \Delta z)^T$.