

global travel in local time

On 06/07/25, following M & Z's presque-polar geodesic path across multiple time zones, I started musing on some alternative flights. I recall that *our globe is the original 24-hour clock*:- for any pair of points other than its fixed points, the local time-of-the-day at A is 4θ minutes ahead of B —because $4 \times 360 = 24 \times 60$ —if and only if the (semi) *longitude* through A is θ degrees to the east of B ; no longitude or time-of-the-day is assigned to the poles N, S . $\square$ So if B has the same longitude as A flying north or south to it is fine at any speed, but otherwise there is a change in local time-of-the-day of 4θ minutes irrespective of how we fly. The globe's maximum eastwards *rotational speed* M at the equator is beyond the reach of today's jetliners, but we can always fly north or south to a latitude, such that on it flying westwards at just the right constant speed s we can easily *neutralize rotation*, but at this smaller and smaller speed, this now very small hop to the longitude of B , during which we can stop our wrist watch, still takes 4θ minutes, after which, restarted, our watch will give the new local time-of-the-day, as we now fly north or south to B .

For $s \in (0, M]$ north or south of the *latitudes* $\pm\phi_s$ on which rotational speed is s , there are also two families of *constant speed s westerly spirals* that solve our *differential equation*: latitudinal component neutralizes rotation:- That is, the integral curves of the *smooth rotation-invariant vector fields* $V_{s,\pm}$ of length s with longitudinal components always northerly, respectively southerly. These two rotation invariant families of spirals run between the two circles $\pm\phi_s$ and the poles $\pm N$. $\square$ Though today's jetliners cruise at speeds below M , we can fly also at any constant speed $s > M$, when these two rotation invariant families of westerly spirals fill the entire globe minus the poles N, S . In particular there always exists a unique, usually south or north westerly spiral, but occasionally circular, rotation neutralizing flight path that takes us at a suitable constant positive speed from A to B in exactly 4θ minutes.