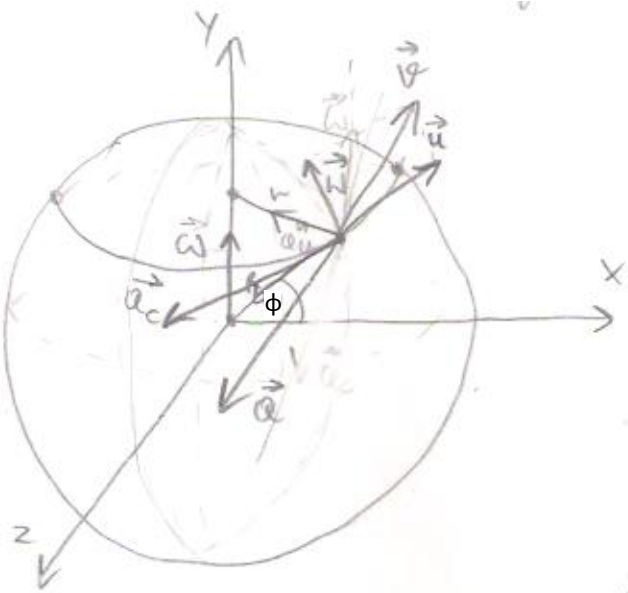
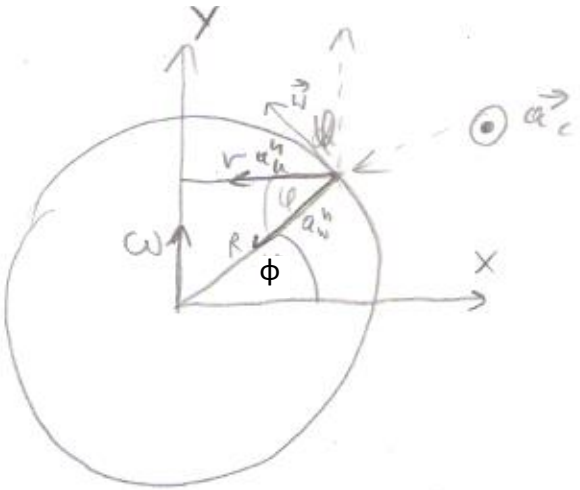
Car rides from equator in direction to north pole.
Road which car uses is parallel to meridian.

Known:
R - Earth globe radius [km]
ω - angular velocity of Earth rotation [rad/s]
ϕ - angle between Earth radius R and plane of equator[rad]
w - relative velocity of car - moving coordinates system [m/s]

Find:
v - absolute velocity
a - absolute acceleration





$\frac{r}{R} = \cos\varphi \rightarrow r = R \cdot \cos\varphi$

$\vec{W}$ - prędkość względem
$\vec{u}$ - prędkość unosz

$\vec{v} = \vec{W} + \vec{u}$ $\quad u = \omega \cdot r$

$|\vec{v}| = \sqrt{W^2 + u^2}$

$\vec{a}_c = 2\vec{\omega} \times \vec{W}$

$\vec{a} = \vec{a}_W + \vec{a}_u + \vec{a}_c$

$\vec{a}_W = \vec{a}_W^u + \vec{a}_W^t$ $\quad a_W^u = \left(\frac{W}{R}\right)^2 \cdot R = \frac{W^2}{R}$ $\quad a_W^t = 0$

$\vec{a}_u = \vec{a}_u^u + \vec{a}_u^t$ $\quad a_u^u = \omega^2 \cdot r$

$\vec{a}_c = 2\vec{\omega} \times \vec{W}$

$|\vec{a}_c| = 2\omega \cdot W \cdot \sin\sphericalangle(\vec{\omega}, \vec{W})$

$|\vec{a}_c| = 2\omega \cdot W \sin\varphi$

$|\vec{a}| = a_W^{u2} + a_u^{u2} + a_c^2$

$|\vec{a}| = \frac{W^4}{R^2} + \omega^4 \cdot r^2 + 4\omega^2 \cdot W^2 \cdot \sin^2\varphi$

$r^2 = x^2 + y^2$