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OSMON JISMLARINING KOORDINATALARI VA ULAR ORASIDAGI BOG'LANISHLARNI TOPISHGA DOIR MASALALAR YECHISH METODIKASI

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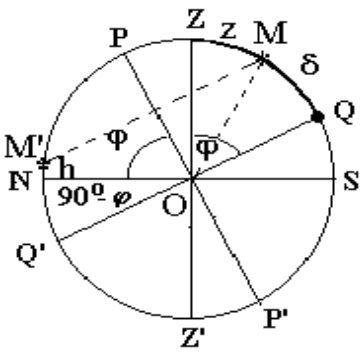
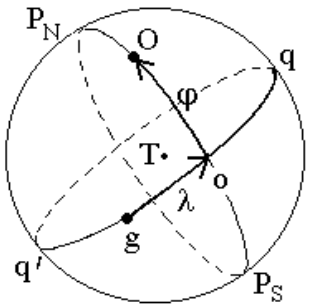
Annotatsiya: *Osmon sferasida nuqtaning (xususan, yoritkichning) vaziyati sfera sirtidagi 2 ta koordinata bilan aniqlanadi. Eng ko'p ishlatiladigan bunday koordinatalar sistemasi to'rtta. Bularning har birida nuqtaning vaziyati ikkita koordinata bilan aniqlanadi, ulardan biri nuqtaning biror bir asosiy aylana tekisligidan burchak masofasini beradi, ikkinchisi esa ushbu aylana tekisligida yotgan uning biror bir aniq nuqtasidan boshlab hisoblanadi.*

Tayanch so'zlar va iboralar: *yoritkich, koordinata, geografik kenglama, geografik uzunlama, 1-ekvatorial koordinatalar sistemasi, 2-ekvatorial koordinatalar sistemasi, soat burchagi, minut yoyi, sekund yoyi.*

Geografik koordinatalar sistemasi





$\overset{\cup}{oO}$ = φ - geografik kenglama

$\overset{\cup}{go}$ = λ - geografik uzunlama

Yoritkich (M nuqta) gorizontdan yuqoriga ko'tarilib borgan holda yuqori kulminatsiyada osmon meridianini kesib o'tadi. Bu momentda uning soat burchagi $t=0^h$, gorizontdan balandligi esa maksimal qiymatga erishadi.

Quyi kulminatsiyada yoritkich ($M^/$ nuqta) zenitdan eng uzoqda turadi, uning soat burchagi $t=12^h$, gorizontdan balandligi esa minimal qiymatga erishadi (yoki yoritkich gorizontdan pastda joylashadi).

Yoritkichning yuqori kulminatsiyasida uning og'ishi, zenit masofasi va kuzatuv joyining kenglamasi quyidagi formula orqali bog'lanadi

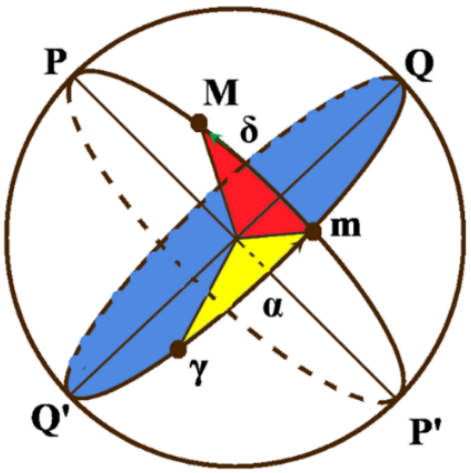
$$z = \pm (\varphi - \delta).$$

"+" ishora kulminatsiya zenitdan janubda bo'lganda, "-" ishora esa shimolda bo'lganda olinadi.

Birinchi ekvatorial koordinatalar sistemasi

Bu sistemada yoritkichlarning o'rni soat burchagi t va og'ish burchagi yoki og'ish δ deyiluvchi koordinatalarda o'lchanadi. Koordinata boshi qilib, osmon meridianining (*P, Q, S, P′yoy*) janubiy qismi bilan osmon ekvatorining kesishgan nuqtasi Q olinadi). Osmondagi istalgan yoritkichning soat burchagini diametr uchun u orqali yarim og'ish aylanasi o'tkazilib, uning osmon ekvatori bilan kesishgan nuqtasi K topiladi. Bu nuqtaning koordinata boshidan uzoqligi yoki yoritkich orqali o'tgan yarim og'ish aylanasining osmon diametri bilan hosil qilgan olam qutbidagi sferik burchagi – yoritkichning soat burchagi deyiladi.

Yoritkichning og'ishi esa, yoritkichdan o'tgan yarim og'ish aylanasining osmon ekvatori bilan kesishgan nuqtasidan (K) yoritkichgacha bo'lgan yoy uzunligi bilan o'lchanadi. Yoritkichning soat burchagi, sferaning markazida turgan kuzatuvchi uchun, soatlarda (h) minutlarda (m) va sekundlarda (s) soat strelkasi yo'nalishi bo'ylab yoki, boshqacha aytganda, osmon sferasining aylanishi yo'nalishi bo'ylab, 0^0 dan 360^0 gacha (yoy hisobida) yoki 24^h gacha (vaqt hisobida) o'lchanadi. Ba'zan yo'nalish musbat yo'nalish deb qabul qilinib, to 180^0 gacha (yoy hisobida) yoki $+12^h$ gacha hisoblanadi, u holda teskari yo'nalish bo'ylab t ning ishorasi manfiy hisoblanib, -12^h gacha o'lchanadi. Yoritkichning og'ish burchagi, osmonning shimoliy yarim sharida musbat ishorali, janubiy yarim sharida esa manfiy ishoralidir. Og'ish burchagi yoy graduslarida, minutlarida va sekundlarida o'lchanadi. Ba'zan yoritkichning og'ish burchagi δ o'rniga uning qutbdan uzoqligi r ishlatiladi. Yoritkichning qutbdan uzoqligi *r*, og'ish burchagini 90^0 ga to'ldiruvchi burchak bo'lganidan, (ya'ni $\delta + r = 90^0$), bu burchaklardan birining berilishi kifoya. Aniq bir yarim og'ish aylanasi ustida yotgan barcha yulduzlarning soat burchaklari bir xil bo'ladi.



- **Asosiy aylana:** Osmon ekvatori
- **Asosiy nuqta:** Bahorgi teng kunlik nuqtasi
- PP'- olam o‘qi
- $\widetilde{mM}=\delta$ - og‘ish
- $(-90^0\leq\delta\leq+90^0)$
- $\widetilde{\gamma M}=\alpha$ - to‘g‘ri chiqish
- $(0^h\leq\alpha\leq24^h)$ yoki
- $(0^0\leq\alpha\leq360^0)$

Ikkinchi ekvatorial koordinatalar sistemasi

Bu ekvatorial sistemada koordinata boshi qilib, ekliptika va osmon ekvatorining kesishgan, nuqtalaridan biri – bahorgi tengkunlik nuqtasi γ olinadi. Yoritkichlarning o’rni ularning to’g’ri chiqishi α va og’ishi δ deyiluvchi koordinatalar orqali harakterlanadi. Yoritkichning to’g’ri chiqishi α, u orqali o’tgan yarim og’ish aylanasining osmon ekvatori bilan kesishgan K nuqtasining γ dan uzoqligi bilan yoki γ OK tekis burchak bilan o’lchanadi α ham, soat burchagi t kabi, soatlarda, minutlarda va sekundlarda o’lchanadi.Yoritkichning to’g’ri chiqishi α, γ – nuqtasidan osmon sferasining ko’rinma aylanishiga teskari yo’nalishda 0^h dan 24^h gacha o’lchanadi.

Yoritkichning og’ishi 1–ekvatorial sistemada eslatilganidek o’lchanadi. Yoritkichlarning 2–ekvatorial koordinatalar sistemasida aniqlangan koordinatalari, Yer sharining hamma nuqtalarida bir xil bo’ladi; biroq gorizontal koordinatalar (A, h, z) va 1–ekvatorial koordinatalar sistemasining soat burchagi t, yoritkichlarning sutkalik ko’rinma harakatlari tufayli, sutka davomida o’zgaradi. Ekvator bo’ylab joylashgan barcha yoritkichlarning og’ishi 0^0 ga teng bo’lib, ma’lum yarim og’ish aylanasi bo’ylab joylashgan barcha yoritkichlar bir xil to’g’ri chiqishga ega bo’ladilar.

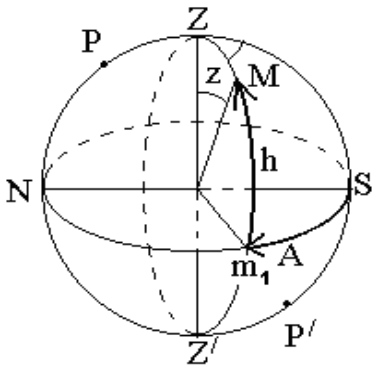
Ekliptik koordinatalar sistemasi

Ekliptik koordinatalar sistemada yoritkichlarning o’rni kenglama β va uzunlama λ (ba’zan, mos ravishda, eklitikal kenglama va ekliptikal uzunlama) deyiluvchi koordinatalar bilan xarakterlanadi. Koordinata boshi sifatida bu sistemada ham bahorgi tengkunlik nuqtasi γ olinadi. Yoritkichlarning diametri kenglamasi β, ekliptikadan M yoritkichdan o’tgan kenglik aylanasi bo’ylab to yoritkichgacha bo’lgan yoy bilan (yoki

MOK tekis burchak orqali) o'lchanadi. Kenglik aylanasi deb yoritkich va ekliptika qutblari orqali o'tgan aylanaga aytiladi.

Yoritkichning georafik uzunlamasi λ esa, bahorgi tengkunlik nuqtasidan γ yoritkich orqali o'tgan kenglik yarim aylanasining ekliptika bilan kesishgan nuqtasigacha bo'lgan yoy uzoqligi (ekliptika bo'ylab) bilan yoki tok tekis burchak bilan o'lchanadi. Uni o'lchash, osmon sferasining sutkalik ko'rinma aylanishiga teskari yo'nalishda bajariladi. Astronomik uzunlama yoy gradusi, minuti va sekundlarida; uzunlamasi esa – vaqt soati, minuti va sekundlarida o'lchanadi.

Gorizontal koordinatalar sistemasi (h, A):



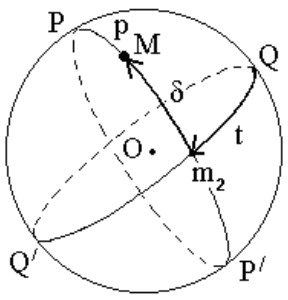
$\overset{\cup}{mM}$ = h - balandlik ($-90^0 \le h \le +90^0$)

$\overset{\cup}{SM}$ = A - azimut ($0^0 \le A \le 360^0$)

$\overset{\cup}{ZM}$ = z - zenit masofa ($0^0 \le z \le 180^0$)

$z+h=90^0$

Ekvatorial koordinatalar I sistemasi (t, δ):



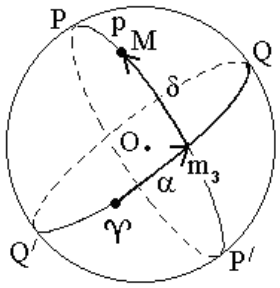
$\overset{\cup}{Qm}$ = t - soat burchak ($0^0 \le t \le 360^0$)

$\overset{\cup}{mM}$ =δ - og'ish ($-90^0 \le \delta \le +90^0$)

$\overset{\cup}{PM}$ =p - qutb masofa

$p+\delta=90^0$

Ekvatorial koordinatalar II sistemasi (α, δ):

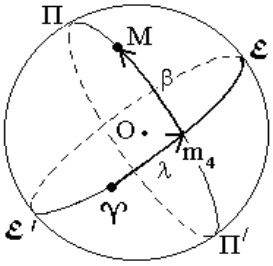


$\overset{\cup}{mM}$ = δ - og'ish ($-90^0 \le \delta \le +90^0$)

$\overset{\cup}{\gamma m}$ = α - to'g'ri chiqish ($0^h \le \alpha \le 24^h$)

yoki ($0^0 \le \alpha \le 360^0$)

Ekliptik koordinatalar sistemasi (β, λ):



$\overset{\cup}{mM} = \beta$ - ekliptik kenglama

$(-90^0 \le \beta \le +90^0)$

$\overset{\cup}{\gamma m} = \lambda$ - ekliptik uzunlama $(0^0 \le \lambda \le 360^0)$

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