

JHS 154 ETRS89-järjestelmään liittyvät karttaprojektiot, tasokoordinaatit ja karttalehtijako, Liite 2: Esimerkit

Versio: 6.6.2008

Julkaistu:

Voimassaoloaika: Toistaiseksi

Esimerkkeinä projektiolaskuista esitetään muunnos geodeettisista koordinaateista tasokoordinaateiksi ja päinvastoin välituloksineen ETRS-TM35FIN – koordinaatistossa. Lisäksi esitetään lopputulokset muunnoksille geodeettisista koordinaateista ETRS-GK – koordinaatiston eri kaistoihin.

Esimerkki 1: Projektiolaskut ETRS-TM35FIN – koordinaatistossa

Lähtötiedot: Piste G4 (Geta) EUREF-FIN – koordinaatit:

$$\begin{aligned}\varphi &= 60^{\circ} 23' 06.38474'' = 1.053918934088933 \text{ rad} \\ \lambda &= 19^{\circ} 50' 53.29237'' = 0.346415337012956 \text{ rad} \\ h &= 118.309 \text{ m}\end{aligned}$$

GRS80 – vertausellipsoidin parametrit:

$$\begin{aligned}a &= 6\,378\,137.0 \text{ m} \\ f &= 1/298.257222101\end{aligned}$$

Karttaprojektion parametrit:

$$\begin{aligned}k_0 &= 0.9996 \\ \lambda_0 &= 27^{\circ} \\ E_0 &= 500\,000 \text{ m}\end{aligned}$$

Apusuureet:

$$\begin{aligned}n &= 0,001679220395 \\ A_1 &= 6367449,145771 \\ e^2 &= 0,006694380023 \\ e'^2 &= 0,006739496775 \\ V^2 &= 1,00164579775 \\ \\ h_1 &= 0,000837732168164 \\ h_2 &= 0,000000059058696 \\ h_3 &= 0,000000000167349 \\ h_4 &= 0,000000000000217 \\ \\ h_1' &= 0,000837731824734 \\ h_2' &= 0,000000760852779 \\ h_3' &= 0,000000001197638 \\ h_4' &= 0,000000000002443\end{aligned}$$

JUHTA - Julkisen hallinnon tietohallinnon neuvottelukunta

| Geodeettisista koordinaateista tasokoordinaateiksi | Tasokoordinaateista geodeettisiksi koordinaateiksi |
|---|---|
| φ = 1.053918934088933 | E = 106256,35958 |
| λ = 0.346415337012956 | N = 6715706,37705 |
| Q' = 1,330479626914950 | ξ = 1,055115412897463 |
| Q'' = 0,071251194462820 | η = -0,061861695615107 |
| Q = 1,324649911823168 | ξ_1' = 0,000724281930916 |
| l = -0,124823561025513 | ξ_2' = -0,000000053657596 |
| β = 1,051030767588720 | ξ_3' = 0,000000000008501 |
| η' = -0,061915076853879 | ξ_4' = 0,000000000000203 |
| ξ' = 1,054391184619376 | η_1' = 0,000053374333729 |
| ξ_1 = 0,000724918454654 | η_2' = 0,000000006973167 |
| ξ_2 = -0,000000690230193 | η_3' = -0,000000000063479 |
| ξ_3 = 0,000000000055283 | η_4' = 0,000000000000062 |
| ξ_4 = 0,000000000002298 | ξ' = 1,054391184615438 |
| η_1 = 0,000053291297517 | η' = -0,061915076858586 |
| η_2 = 0,000000090400064 | β = 1,051030767584305 |
| η_3 = -0,000000000454791 | l = -0,124823561034060 |
| η_4 = 0,000000000000692 | Q = 1,324649911814278 |
| ξ = 1,055115412901418 | Q' = 1,330469999534920 |
| η = -0,061861695610397 | Q'' = 1,330479611087242 |
| | Q''' = 1,330479626880053 |
| | $Q^{(4)}$ = 1,330479626906003 |
| | $Q^{(5)}$ = 1,330479626906045 |
| | |
| Tasokoordinaatit: | |
| E = 106256,35961 | φ = 1,053918934084532 |
| N = 6715706,37708 | = 60°23'06.384739" |
| | λ = 0,346415337004409 |
| | = 19°50'53.292368" |

| Meridiaanikonvergenssi ja mittakaavakerroin | | |
|---|----------------|---------------|
| γ = | -0,108655736 = | -6,225515089° |
| k = | 1,001501684 | (1502 ppm) |

JUHTA - Julkisen hallinnon tietohallinnon neuvottelukunta

Esimerkki 2: Projektiolaskut ETRS-GK –koordinaatistoissa

Lähtötiedot: Piste G42 (Kymi) EUREF-FIN – koordinaatit:

$$\begin{aligned} \varphi &= 60^\circ 31' 15.86470'' = 1.056292000 \text{ rad} \\ \lambda &= 26^\circ 54' 25.76350'' = 0.469618474 \text{ rad} \\ h &= 71.214 \text{ m} \end{aligned}$$

GRS80 – vertausellipsoidin parametrit:

$$\begin{aligned} a &= 6\,378\,137.0 \text{ m} \\ f &= 1/298.257222101 \end{aligned}$$

Karttaprojektion parametrit:

$$\begin{aligned} k_0 &= 1.0 \\ \lambda_0 &= 19^\circ - 31^\circ \\ E_0 &= 500\,000 \text{ m} \end{aligned}$$

Piste G42 koordinaatit, meridiaanikonvergenssi ja mittakaavakerroin ETRS-GK –koordinaatiston eri kaistoissa:

| | | |
|-----|-------------------|---|
| 19° | E = 933549.030 m | γ = +0.120324829 rad = +6°53'39" |
| | N = 6738233.823 m | k = 1.002306100 (2306 ppm) |
| 20° | E = 878867.261 m | γ = +0.105069207 rad = +6°01'12" |
| | N = 6732045.175 m | k = 1.001759690 (1760 ppm) |
| 21° | E = 824125.258 m | γ = +0.089829144 rad = +5°08'49" |
| | N = 6726693.699 m | k = 1.001287047 (1287 ppm) |
| 22° | E = 769331.899 m | γ = +0.074602387 rad = +4°16'28" |
| | N = 6722178.673 m | k = 1.000888173 (888 ppm) |
| 23° | E = 714495.986 m | γ = +0.059386685 rad = +3°24'09" |
| | N = 6718499.484 m | k = 1.000563066 (563 ppm) |
| 24° | E = 659626.265 m | γ = +0.044179783 rad = +2°31'53" |
| | N = 6715655.628 m | k = 1.000311727 (312 ppm) |
| 25° | E = 604731.429 m | γ = +0.028979431 rad = +1°39'37" |
| | N = 6713646.713 m | k = 1.000134156 (134 ppm) |
| 26° | E = 549820.136 m | γ = +0.013783374 rad = +0°47'23" |
| | N = 6712472.461 m | k = 1.000030353 (30 ppm) |
| 27° | E = 494901.020 m | γ = -0.001410639 rad = -0°04'51" |
| | N = 6712132.709 m | k = 1.000000318 (0.3 ppm) |
| 28° | E = 439982.705 m | γ = -0.01660486 rad = -0°57'05" |
| | N = 6712627.410 m | k = 1.000044051 (44 ppm) |
| 29° | E = 385073.814 m | γ = -0.031801546 rad = -1°49'20" |
| | N = 6713956.632 m | k = 1.000161552 (162 ppm) |
| 30° | E = 330182.986 m | γ = -0.047002944 rad = -2°41'35" |
| | N = 6716120.560 m | k = 1.000352820 (353 ppm) |
| 31° | E = 275318.884 m | γ = -0.062211309 rad = -3°33'52" |
| | N = 6719119.494 m | k = 1.000617857 (618 ppm) |