**Question:** You are asked to estimate net to gross ratio (NTG) for the next vertical well given 3 previously drilled vertical wells. Spatial data and NTG for the previously drilled wells are given in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **X** | **Y** | **NTG** |
| **Well 1** | 600 | 800 | 0.25 |
| **Well 2** | 400 | 700 | 0.43 |
| **Well 3** | 800 | 100 | 0.56 |

The global stationary mean of net to gross ratio is 0.38. Its standard deviation is 0.05 and variance is equal to sill which is equal to 0.0025. Assume that the base variogram is isotropic, spherical with a range of 700 m (zero nugget). The first candidate well location is 500 m, 500 m. Assuming the base case isotropic spherical variogram work out the simple kriging weights, estimate, estimation variance.

**Simple Kriging**

distance matrix:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 0 | 224 | 728 | 316 |
| 224 | 0 | 721 | 224 |
| 728 | 721 | 0 | 500 |

the variogram matrix:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 0.000000 | 0.001157 | 0.002500 | 0.001579 |
| 0.001157 | 0.000000 | 0.002500 | 0.001157 |
| 0.002500 | 0.002500 | 0.000000 | 0.002223 |

covariance matrix becomes:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 0.002500 | 0.001343 | 0.000000 | 0.000921 |
| 0.001343 | 0.002500 | 0.000000 | 0.001343 |
| 0.000000 | 0.000000 | 0.002500 | 0.000277 |

Range = 700 Nugget Effect = 0%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

Range = 300 Nugget Effect = 0%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

Range = 1100 Nugget Effect = 0%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

Range = 700 Nugget Effect = 10%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

Range = 700 Nugget Effect = 50%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

Range = 700 Nugget Effect = 90%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |