Question

Figure below gives the porosity distribution in a 2D heterogeneous and possibly anisotropic reservoir.

26	22	19	14	16	19	16	14
23	20	17	20	14	23	21	17
22	17	18	19	18	25	20	19
21	15	20	18	20	20	18	13
19	18	15	15	18	23	22	20
18	16	10	16	14	18	20	18
17	14	10	13	13	15	14	17
15	13	11	10	17	16	15	11

a. Plot the experimental variograms in the E-W, N-S, NE-SW and NW-SE directions. Perform the calculations up to and including a lag distance of 4 units. The samples are on a square grid.

b. Do the variograms show any evidence of anisotropy in the porosity data?

Solution

a. Variogram values in the different directions:

		E-W	N-S			NE-SW	NW-SE
h	N	γ	γ	h	N	γ	γ
1	56	6.411	4.982	1.414	49	7.459	7.806
2	48	9.490	8.750	2.828	36	13.194	13.431
3	40	10.575	10.675	4.243	25	19.280	10.680
4	32	10.547	12.953	5.657	16	18.406	12.625

b. Yes. There is evidence of anisotropy in the variograms in the different directions. The variograms in E-W and N-S directions are essentially the same. The variograms in the NE-SW and NW-SE directions are higher than in the other two directions at lag distances greater than 2.