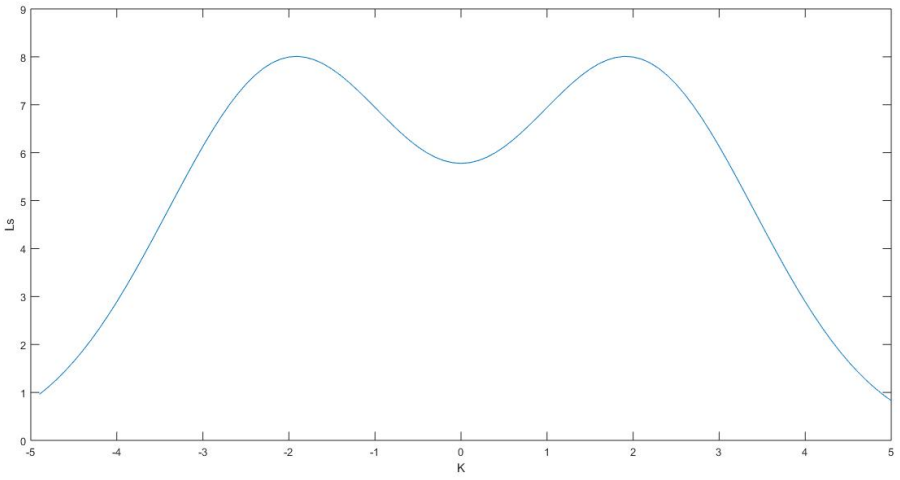
1 Dependence of L_s on K

$$L_s = \int\int 5\cos(Kx)e^{-x^2-y^2}\cos(2x)dydx$$



2 Comments

1. First of all, the graph is symmetric about K=0, as expected, because K appears in the argument of cosine which is an even function.
2. Note that, K represents the spatial frequency of the grating stimulus. Now the graph shows that the response attains a maxima at $K = \pm 2$. That's when the spatial frequency of the stimulus exactly matches with the spatial frequency of the Receptive Field.
3. As we change K from ± 2, the overlap region of stimulus and receptive field decreases therefore a decrease in response is expected, which is also seen in the graph.
4. At K=0, the stimulus is just a blank screen, but still the response is not zero, because the receptive field does not have equal positive and negative areas. That's because the exponential term drops the magnitude of the receptive field which results in a smaller negative region as compared to the positive region. Therefore even at K=0, we get a positive response.
5. At very high values of K (very high spatial frequency of stimulus), we get a very low response, because the response from the positive half cycle of the stimulus almost cancels the response from the adjacent negative half cycle. Because the positive and negative half cycles occur in a very short region in which the value of receptive field remains approximately constant.