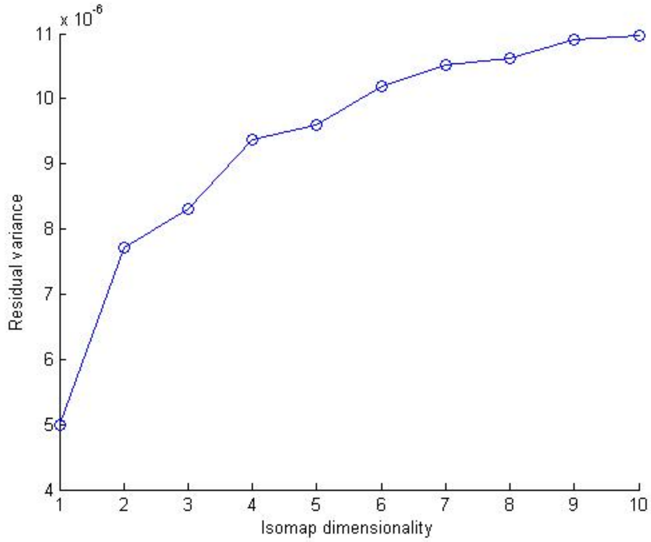

Euclidean distance for k=7

As observed from the residual variance curve, the dimensionality is 1. Let the angles be θ_1,θ_2,θ_3 and θ_4 as mentioned in the pdf file of Part B3. As observed in the image files, the box remains at a constant height above the base of the two arms. If there was no box and the arms could move independently, the degree of freedom would have been 4 as in Part B. But since the height of the box has to be constant, we conclude that l_1 sinθ_1 + l_2 sinθ_2 = constant where l_1, l_2, l_3, l_4 are the length of the arms making the corresponding θ's. Therefore taking θ_1 to be the independent variable, θ_2 depends on θ_1. Similarly, for arm2, θ_4 depends on θ_3. The motion of the arms is constrained along the horizontal direction by the equation

l_3 cos θ_3 + l_4 cos θ_4 - l_1 sinθ_1 + l_2 sinθ_2 = constant = width of the box

as the two arms always hold the box along the midline as seen in the images. Therefore, θ_3 depends on θ_1. Therefore taking θ_1 as the independent variable, all other variable can be expressed in tterms of θ_1 reducing the dimensionality of the problem to 1.