An example with 5x5 matrices which are pair-wise unitarily similar but not S.U.S

It runs for 2 iterations showing that the collection is not S.U.S

Printing salient results of each iteration

The given input collection of p=2, 2-tuples (A_l,B_l)

Displaying 2 decimal places

A_1

0.26 + 0.98j 0.20 + 0.89j 0.28 + 0.65j 0.08 + 0.03j 0.73 + 0.71j

0.32 + 0.38j 0.53 + 0.78j 0.18 + 0.05j 0.11 + 0.69j 0.33 + 0.81j

0.48 + 0.38j 0.51 + 0.79j 0.66 + 0.88j 0.67 + 0.69j 0.26 + 1.00j

0.73 + 0.97j 0.23 + 0.05j 0.99 + 0.08j 0.20 + 0.31j 0.66 + 0.27j

0.48 + 0.37j 0.32 + 0.36j 0.95 + 0.76j 0.80 + 0.66j 0.61 + 0.04j

B_1

0.57 + 0.82j 0.40 + 0.72j -0.83 + 0.43j 1.02 + 0.87j -1.10 + 0.05j

0.88 + -0.03j -0.08 + 0.64j -0.21 + -0.22j 0.63 + -0.27j -0.27 + 0.59j

0.39 + 0.00j -0.06 + 0.47j 0.30 + 0.39j 0.11 + -0.04j 0.17 + 0.59j

0.06 + 1.63j 0.17 + 0.86j -0.26 + 0.06j 1.07 + 0.63j -0.45 + -0.17j

0.21 + -0.77j 0.34 + -1.14j 0.09 + -0.09j -0.07 + -0.68j 0.41 + 0.50j

A_2

0.20 + 0.89j 0.14 + 0.35j 0.27 + 0.05j 0.62 + 0.31j 0.18 + 0.12j

0.70 + 0.88j 0.34 + 0.54j 0.25 + 0.96j 0.82 + 0.68j 0.90 + 0.42j

0.36 + 0.18j 0.14 + 0.29j 0.77 + 0.46j 0.70 + 0.43j 0.52 + 0.30j

0.90 + 0.97j 0.21 + 0.48j 0.64 + 0.19j 0.54 + 0.49j 0.13 + 0.45j

0.55 + 0.92j 0.97 + 0.16j 0.79 + 0.51j 0.02 + 0.23j 0.17 + 0.27j

B_2

0.77 + 0.71j -0.52 + -0.63j 0.21 + 0.02j 0.26 + -0.46j -0.45 + -0.08j

-1.15 + -1.21j 0.68 + 0.90j -0.30 + 0.09j 0.05 + 0.14j 0.56 + -0.89j

-0.44 + 0.03j -0.11 + 0.18j -0.37 + 0.19j -0.04 + -0.51j -0.37 + -0.31j

0.66 + 0.16j 0.05 + -0.18j -0.30 + 0.16j -0.06 + -0.04j -0.24 + 0.34j

0.50 + -1.19j -0.67 + 1.04j -0.47 + 0.56j 0.03 + -0.29j 1.00 + 0.90j

Iteration: 1

U-Induced Partition: [5]

Not in Pre-Solution form

Please refer Definition 3

Reason: A^l_ii/B^l_ii , the l,i,j of A^l_ij which fail's the criterion as follows:

l = 1 ,i = 1 ,j = 1

l^th partitioned matrix of collection from where sub-matrices (S,R) are picked for Diagonalization

A_1

0.26+0.98j 0.20+0.89j 0.28+0.65j 0.08+0.03j 0.73+0.71j

0.32+0.38j 0.53+0.78j 0.18+0.05j 0.11+0.69j 0.33+0.81j

0.48+0.38j 0.51+0.79j 0.66+0.88j 0.67+0.69j 0.26+1.00j

0.73+0.97j 0.23+0.05j 0.99+0.08j 0.20+0.31j 0.66+0.27j

0.48+0.37j 0.32+0.36j 0.95+0.76j 0.80+0.66j 0.61+0.04j

B_1

0.57+0.82j	0.40+0.72j	-0.83+0.43j	1.02+0.87j	-1.10+0.05j
0.88+-0.03j	-0.08+0.64j	-0.21+-0.22j	0.63+-0.27j	-0.27+0.59j
0.39+0.00j	-0.06+0.47j	0.30+0.39j	0.11+-0.04j	0.17+0.59j
0.06+1.63j	0.17+0.86j	-0.26+0.06j	1.07+0.63j	-0.45+-0.17j
0.21+-0.77j	0.34+-1.14j	0.09+-0.09j	-0.07+-0.68j	0.41+0.50j

S

0.26 + 0.98j	0.20 + 0.89j	0.28 + 0.65j	0.08 + 0.03j	0.73 + 0.71j
0.32 + 0.38j	0.53 + 0.78j	0.18 + 0.05j	0.11 + 0.69j	0.33 + 0.81j
0.48 + 0.38j	0.51 + 0.79j	0.66 + 0.88j	0.67 + 0.69j	0.26 + 1.00j
0.73 + 0.97j	0.23 + 0.05j	0.99 + 0.08j	0.20 + 0.31j	0.66 + 0.27j
0.48 + 0.37j	0.32 + 0.36j	0.95 + 0.76j	0.80 + 0.66j	0.61 + 0.04j

R

0.57 + 0.82j	0.40 + 0.72j	-0.83 + 0.43j	1.02 + 0.87j	-1.10 + 0.05j
0.88 + -0.03j	-0.08 + 0.64j	-0.21 + -0.22j	0.63 + -0.27j	-0.27 + 0.59j
0.39 + 0.00j	-0.06 + 0.47j	0.30 + 0.39j	0.11 + -0.04j	0.17 + 0.59j
0.06 + 1.63j	0.17 + 0.86j	-0.26 + 0.06j	1.07 + 0.63j	-0.45 + -0.17j
0.21 + -0.77j	0.34 + -1.14j	0.09 + -0.09j	-0.07 + -0.68j	0.41 + 0.50j

Setting up an Equivalent Problem

U `blocks further', New partition

Refer Theorem 2, Proof item number/s: 1

[1, 1, 1, 1, 1]

Iteration: 2

U-Induced Partition: [1, 1, 1, 1, 1]

Not in Pre-Solution form

Please refer Definition 3

Reason: A^l_ii/B^l_ii , the l,i,j of A^l_ij which fail's the criterion as follows:

l = 2 ,i = 1 ,j = 1

l^th partitioned matrix of collection from where sub-matrices (S,R) are picked for Diagonalization

A_2

-0.06+0.20j	0.13+0.03j	0.62+-0.20j	-0.15+0.32j	0.44+0.41j
-0.28+0.53j	0.04+0.08j	0.17+-0.22j	-0.28+-0.48j	0.93+0.10j
0.27+-0.17j	0.17+0.55j	0.13+0.35j	-0.19+0.04j	0.20+0.12j
0.30+-0.29j	0.42+0.33j	-0.06+-0.34j	-0.29+-0.02j	0.55+-0.05j
-0.07+-0.38j	0.45+0.71j	-0.03+0.64j	-0.38+-0.43j	2.21+2.05j

B_2

1.61+1.71j	0.37+-1.50j	-0.35+-0.61j	0.69+0.09j	0.48+0.93j
-0.16+0.45j	0.31+0.27j	-0.53+0.26j	-0.48+-0.02j	-0.26+0.17j
-0.08+-0.41j	-0.10+0.02j	0.04+0.28j	0.19+-0.10j	0.16+-0.39j

```
-------------+-------------+-------------+-------------+-------------
  0.01+1.05j  | -0.27+0.07j | 0.38+-0.12j  | -0.41+0.31j  | -0.35+0.07j
-------------+-------------+-------------+-------------+-------------
  0.93+0.06j  | -0.41+0.09j | -0.22+0.10j  |  0.49+0.16j  |  0.47+0.08j
```

S

-0.06 + 0.20j

R

 1.61 + 1.71j

Setting up an Equivalent Problem

vals_A

[0.196993025]

vals_B

[1.709486354]

mults_A

[1]

mults_B

[1]

NOT S.U.S

Reason: The eigen-values of (S,R) used for setting up equivalent problem do not match

Refer Theorem 2, Proof item number/s: 1