Previous Steps:

1. loadInitialPackingData.py script to read Matlab results and create a binary grid of size 1672 and save the result as gridInitialPack.npy on the path /Users/tareqaljamou/anaconda3/envs/Master/Data/ gridInitialPack.npy

And save it as a picture on the path

/Users/tareqaljamou/anaconda3/envs/Master/output\_images/ IntiailGrid1.pdf



1. croppedGrid.py script to crop the grid to a size of 500 and save the result as a binary grid with the name CroppedGrid1.npy on the path /Users/tareqaljamou/anaconda3/envs/Master/Data/CroppGrids/ CroppedGrid500.npy

And save it as a picture on the path /Users/tareqaljamou/anaconda3/envs/Master/output\_images/ CroppedGrid\_500.jpg

Chart

Description automatically generated

1. morphologicalDilation.py script to shrink the spheres to obtain a different contact angle and save the result as a binary grid with the name eroded\_CroppedGrid1.npy on the path /Users/tareqaljamou/anaconda3/envs/Master/Data/ErodedGrids/25iterations/eroded\_CroppedGrid500.npy

And save it as a picture on the path /Users/tareqaljamou/anaconda3/envs/Master/output\_images/25iterations /eroded\_CroppedGrid500.pdf



1. morphologicalInvasion\_Eroded.py script to invade each 500 grid with oil, and save the results as maxConCirc.npy, distTrans.npy and distanceTransform.pdf on the path /Users/tareqaljamou/anaconda3/envs/Master/Data/ErodedGrids/25iterations/

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| --- | --- |
| Graphical user interface  Description automatically generated with low confidence | Chart, bubble chart  Description automatically generated |
| distanceTransform | maxConCirc |

1. Saturation\_Segmentation.py script to create maps of water-oil distribution at different pressures using cut-off values, and save the results as SegGrid\_30.npy on the path /Users/tareqaljamou/anaconda3/envs/Master/output\_images/SegementGrids/masks and as SegGrid30.png on the path /Users/tareqaljamou/anaconda3/envs/Master/output\_images/SegementGrids

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| Chart, scatter chart  Description automatically generated | Chart, scatter chart  Description automatically generated | Chart  Description automatically generated |
| 15 | 30 | 40 |

1. expandErodedSpheres.py script to expand the spheres back to normal size after the eroded grid was invaded with fluids and save the result on the path /Users/tareqaljamou/anaconda3/envs/Master/Data/ResizedErodedGrids/25iterations/