CRYO-EM IMAGE PROCESSING USING HELMHOLTZ EQUATION BASED ON IMAGEJ/JIKESRVM – A SIMPLE SUGGESTION ON THE USAGE OF HELMHOLTZ EQUATION.

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Abstract :

This technical note proposes one of the image analysis methodologies for visualizing the electromagnetic fields in the context of Cryo-EM Image Processing. In this paper, visualized electromagnetic field images are analyzed based on Image J/JikesRVM & its Helmholtz equation based Helmholtz plugin.The Helmholtz equation enables us to extract the parameters characterizing the electromagnetic phenomena.

index words : Cryo-EM Image Prcoessing/Helmholtz Theory/JikesRVM/ImageJ

Introduction & Inspiration :

As there are lot of published articles online we are not going into the details of cryo-EM image processing and its background in this short technical note.Please refer to the links provided in this paper.

Source of our inspiration is :

XII-th International Symposium on Electrical Apparatus and Technologies SIELA 2001, Plovdiv, Bulgaria, 31 May – 1 June 2001 -

IMAGE PROCESSING BY FIELD THEORY – PART 2 : APPLICATIONS by
Hisashi ENDO, Seiji HAYANO,Yoshifuru SAITO and Tosiyasu L. KUNII.

Source : http://www.saito-lab.jp/papers/Conference/2001_SIELA_Image_Processing_Part-2.pdf

Readers are advised to read one of our papers on cryo-EM Image Processing :

Kumar, D.N.T. & Shmavonyan, G.s. (2016). Understanding JikesRVM in the Context of Cryo-EM/TEM/SEM Imaging Algorithms and Applications – A General Informatics Introduction from a Software Architecture View Point. International Journal of Applied Research on Information Technology and Computing. 7. 1. 10.5958/0975-8089.2016.00001.4.

Informatics Framework Design :

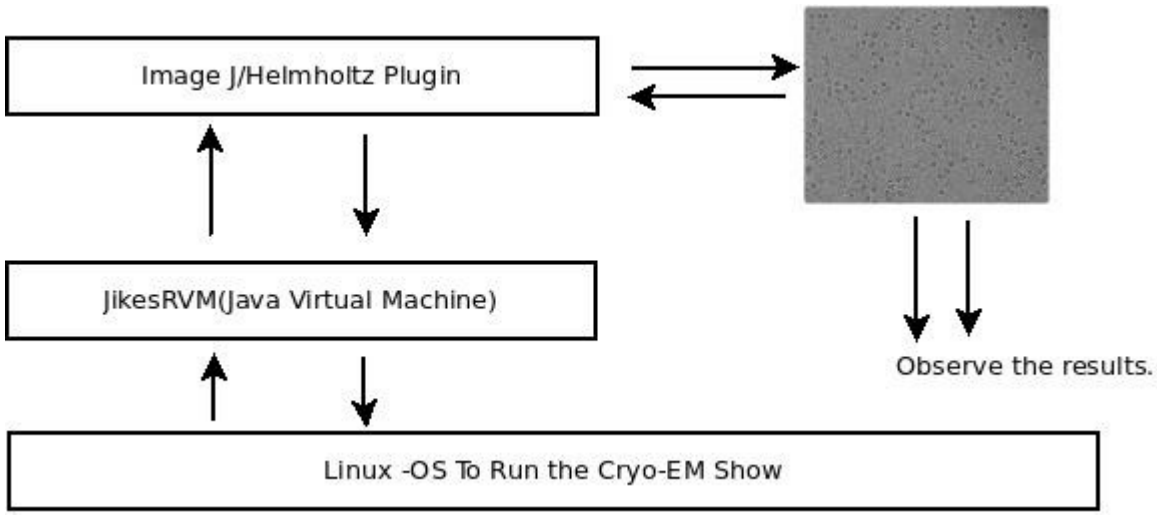

Figure I – Approximate Cryo-EM Image Processing Framework Using ImageJ/ ImageJ Helmholtz-Plugin/JikesRVM(Java Virtual Machine). (Testing in progress at the time of submission.)

Conclusion & Future Perspectives :

The importance of Helmholtz Equation in the context of Cryo-EM Image Processing was highlighted using ImageJ/JikesRVM/Image J-based Helmholtz Plugin. Hope this attempt will be useful to the readers interested in Cryo-EM Image Processing.

Additional Information on Software & Mathematics Used :

[a] https://imagej.nih.gov/ij/ && https://fiji.sc/ && https://github.com/fiji/Helmholtz_Analysis

[b] http://www.optinav.info/Helmholtz_Analysis.htm/ http://www.optinav.info/helmholtz.pdf

[c] http://www.jikesrvm.org/ https://github.com/JikesRVM/JikesRVM

Acknowledgements :

Thanks to all who inspired me to write this short technical note on cryo-EM Image Processing aspect. No competing financial interests are declared. Purely for academic R&D purpose only. Open source software and related technologies are used. Sole aim is to inspire others to develop more advanced ideas in this challenging domain of image processing.Special thanks to some authors who shared their cryo-EM images with me and encouraged my work.

References :

[1] http://www.jikesrvm.org/Resources/Publications/http://www.jikesrvm.org/Resources/Publications/

[2] http://www.jikesrvm.org/Resources/Dissertations/

[3] https://www.umassmed.edu/es/research/cores/cryo-em-core-facility/about/what-is-cryoem/

[4] http://cryoem.berkeley.edu/cryoem

[5] http://blake.bcm.edu/emanwiki/CryoEMImageProcessing