

Theta Functions & CryoEM Image Processing Aspects – An Insight into Novel Design and Implementation Towards a Promising CryoEM Image Processing Informatics Platform.

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Abstract :

Theta Functions & CryoEM Image Processing Aspects – An Insight into Novel Design and Implementation Towards a Promising CryoEM Image Processing Informatics Platform.
Let us probe and understand complex “Nano-Bio Machines” using Mathematical Tools.

key words : Theta functions/CryoEM Image Processing/Informatics

[I] Introduction & Inspiration :

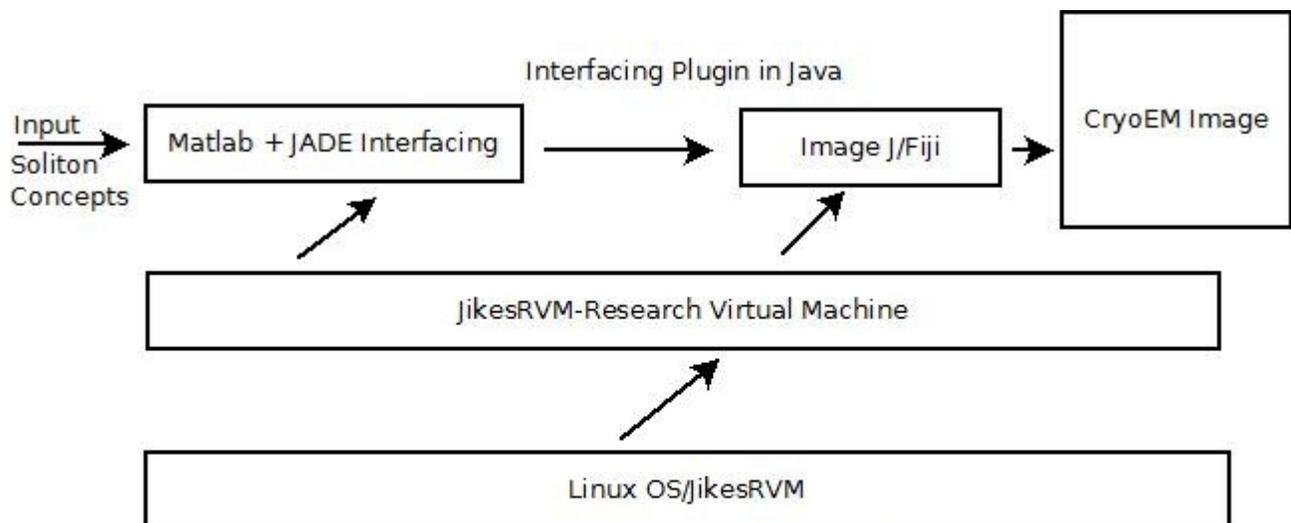
“In mathematics, **theta functions** are **special functions** of several complex variables. They are important in many areas, including the theories of **Abelian varieties** and **moduli spaces**, and of **quadratic forms**. They have also been applied to **soliton** theory. When generalized to a **Grassmann algebra**, they also appear in **quantum field theory**.” [Wiki]

The most common form of theta function is that occurring in the theory of **elliptic functions**. With respect to one of the complex variables (conventionally called z), a theta function has a property expressing its behavior with respect to the addition of a period of the associated elliptic functions, making it a **quasiperiodic function**. In the abstract theory this comes from a **line bundle** condition of **descent**.” [Wiki]

Inspiration : “National Mathematics Day 2018: Ramanujan’s discoveries are now helping physicists explore the dark secrets of the universe. Honouring his contribution, India celebrates his birthday, December 22, as National Mathematics Day.”

Source : [https://www.financialexpress.com/india-news/srinivasa-ramanujan-maths-day-celebration-india-speech-on-srinivasa-ramanujan-birthday-srinivasa-ramanujan-quotes-importance-of-mathematics/1421752/?utm_source=izooto&utm_medium=push_notifications&utm_campaign=National%20Mathematics%20Day&utm_content=&utm_term=]

[II] Approximate Informatics Framework & Implementation :



Approximate Informatics Framework - Simple Suggestion
Actual Implementation varies.

Please Check Igor's MATLAB Functions to implement this framework
Study the references & additional information about Solitons
then implement CryoEM Image Processing Task/s.

Figure I – Simple Suggestion & Approximate Informatics Framework

[III] Conclusion With Future Perspectives :

We derived inspiration from Mathematicians like Ramanujan and present this simple idea to probe Cryo EM Images to understand complex Nano-Bio Machines. It is suggestion only.

[IV] Additional Information on Mathematics & Software Used :

<https://github.com/moiseevigor> [Software – for MATLAB]

<http://moiseevigor.github.io/programming/2015/04/10/current-projects-elliptic-email2db-blog-obre/>

https://en.wikipedia.org/wiki/Theta_function

https://en.wikipedia.org/wiki/Jacobi_elliptic_functions

<http://jade.tilab.com/> - JADE (Java Agent DEvelopment Framework)

<https://www.jikesrvm.org/>

https://www.researchgate.net/figure/The-collaborating-process-between-the-jade-and-matlab-platforms_fig9_282451233

<https://code.google.com/archive/p/matlabcontrol/>

<https://docs.oracle.com/javase/tutorial/networking/sockets/clientServer.html>

<https://github.com/robinroche/mat2jade>

<https://ieeexplore.ieee.org/document/6327451>

[V] Acknowledgment/s :

Thanks to all who made this happen. No competing financial interest/s are declared.
Non Profit Academic R&D Only.

[VI] References :

[1] <https://dspace.mit.edu/bitstream/handle/1721.1/4154/rle-tr-599-35197933.pdf?sequence=1>

[2] <https://studfiles.net/preview/410034/page:42/>

[3] <http://www.ifp.illinois.edu/~singer/solitondet.pdf>

[4] <http://dergipark.gov.tr/download/article-file/83731>

[5] Quantum Imaging - Mikhail I. Kolobov Springer Science & Business Media, 03-Nov-2007-Science -316 pages.