

# **Probability Density Functions as Mathematical Tools to Probe Computational Aspects of Petroleum Sciences in the Context of Computational Fluid Dynamics & Petroleum Microbiology – A Novel Suggestion Using Higher Order Logic(HOL)/Scala/Scalalab/JikesRVM.**

**Nirmal Tej Kumar**

**Current Member : ante Inst,UTD,Dallas,TX,USA.**

**Independent Consultant : Informatics/Photonics/Nanotechnology.**

**R&D Collaborator : USA/UK/Israel/BRICS Group of Nations.**

**Email id : [tejdnk@gmail.com](mailto:tejdnk@gmail.com)**

## **Abstract :**

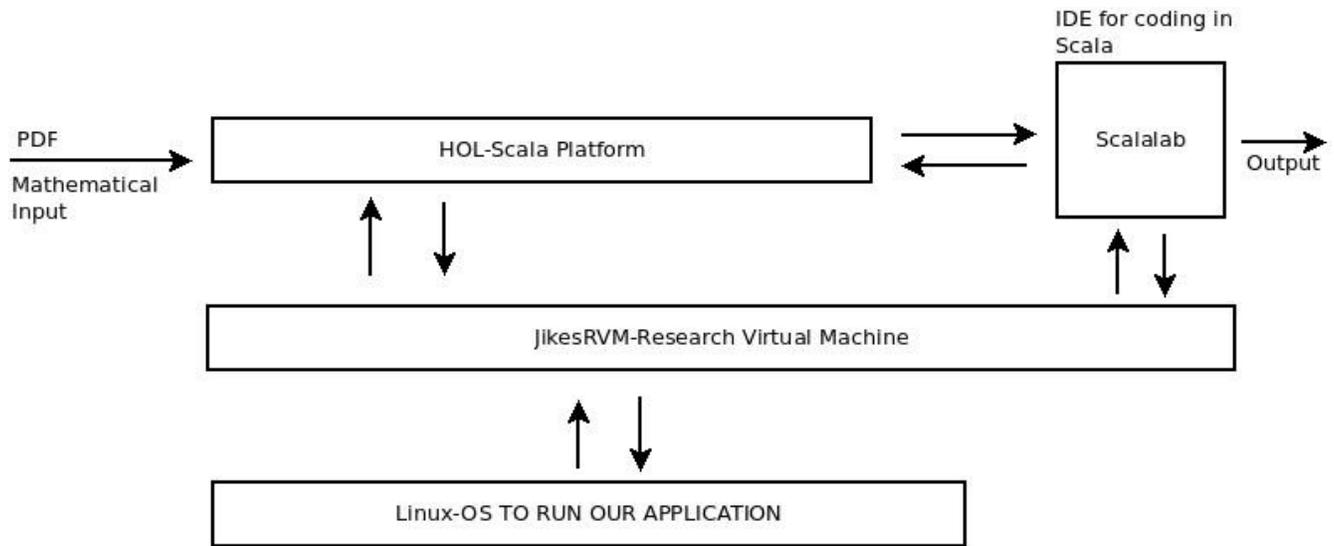
As stated in our TITLE we intend to focus on PDF based computational aspects of Petroleum Sciences and Engineering using HOL-Scala-Scalalab-JikesRVM.To the best of our knowledge we believe this is one of the pioneering short communications in this domain.

**index words :** Probability Density Functions(PDF)/CFD/Petroleum Microbiology/HOL/Scala/JikesRVM.

## Introduction & Inspiration :

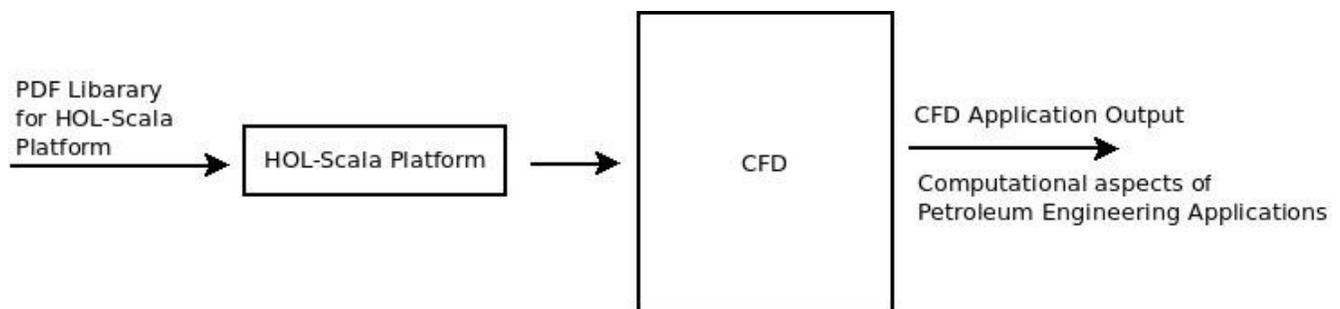
Tej Kumar, Nirmal & Rosa, Andre. (2015). Environmental Sciences Informatics Based on Reaction-Diffusion Mechanisms of Nano-bio Material Systems Using Chemical Sensing and Computing Paradigms-A Novel Suggestion. International Journal of Applied Research on Information Technology and Computing. 6. 75. 10.5958/0975-8089.2015.00010.X.

## Informatics & Information Processing Using HOL-Scala-Scalalab Platform Based on the Following Algorithms :



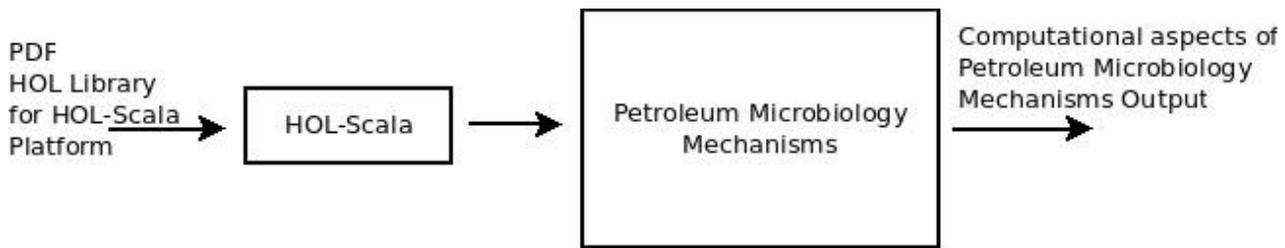
Approximate Informatics Framework to Probe PDF from HOL-Scala-JVM Point of View

Figure I – General Algorithm for Informatics Framework.



Approximate PDF Based HOL-Scala-CFD Informatics Platform

Figure II – Algorithm for PDF/CDF/HOL-Scala Informatics Framework.



Approximate Informatics Platform Based on PDF HOL Library Using HOL-Scala Implementation

**Figure III - Algorithm for PDF/Petroleum Microbiology/HOL-Scala Informatics Framework.**

**Conclusion :**

It is very useful to probe computational aspects of petroleum engineering & sciences using HOL Scala/Scalalab/JikesRVM.

**Additional Information on Mathematics & Software Used :**

[i] <https://isabelle.in.tum.de/>

[ii] <https://www.isa-afp.org/>

[iii] [https://www.isa-afp.org/browser\\_info/current/AFP/Density\\_Compiler/document.pdf](https://www.isa-afp.org/browser_info/current/AFP/Density_Compiler/document.pdf)

[iv] [https://www.isa-afp.org/entries/Density\\_Compiler.html](https://www.isa-afp.org/entries/Density_Compiler.html)

[v] <https://github.com/sterglee/scalalab>

**Acknowledgement/s :**

Thanks to all who inspired and encouraged me to present this work. NON-PROFIT ACADEMIC R&D Work.

## References :

- [1] [https://en.wikipedia.org/wiki/Petroleum\\_microbiology](https://en.wikipedia.org/wiki/Petroleum_microbiology)
- [2] [https://en.wikipedia.org/wiki/Computational\\_fluid\\_dynamics](https://en.wikipedia.org/wiki/Computational_fluid_dynamics)
- [3] <http://www.dfo-mpo.gc.ca/science/documents/coe-cde/cooger-crpgee/microbes-eng.pdf>
- [4] <https://peerj.com/preprints/1398.pdf>
- [5] <https://csomio.org/about-us>
- [6] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3811393/> - Bacterial Community Response to Petroleum Hydrocarbon Amendments in Freshwater, Marine, and Hypersaline Water-Containing Microcosms.
- [7] <https://aslopubs.onlinelibrary.wiley.com/doi/pdf/10.1002/lol2.10030> - The role of microbial exopolymers in determining the fate of oil and chemical dispersants in the ocean.
- [8] <https://www.osti.gov/servlets/purl/752174> – OIL Research.