

My Experience with Julia as a Novice Scientific Code Developer and HPC User

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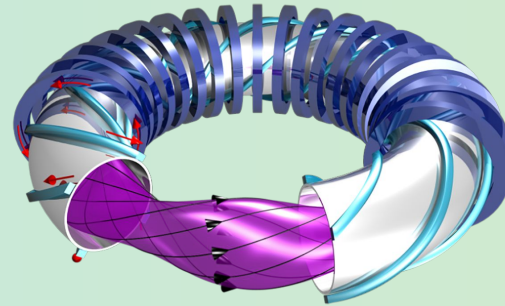
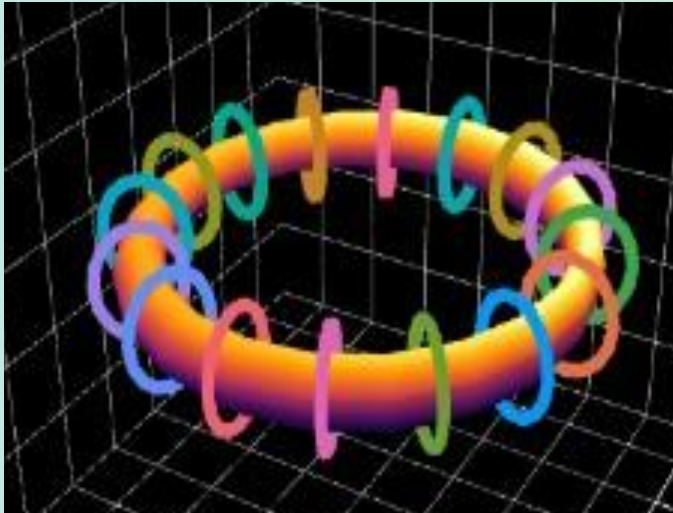
Cornell University

11/16/23



My Experiences with Julia at PPPL

- Stuart Hudson, 2021: **Modifying Stellarator Coils to Minimize Inter-coil Electromagnetic Forces.**
- Adelle Wright, 2022 : **Progress on a Solver for Ideal MHD Stability in Stellarators**



My Experiences with Julia at PPPL

```
function compute_global_stability(filename, N_R, N_Z, N_Phi)
    B_field = MagneticFieldToolkit.read_bmw(filename)
    op = compute_operator(B_field, N_R, N_Z, N_Phi)
    decomp, history = ArnoldiMethod.partialschur(op)
    global lambda, X = ArnoldiMethod.pertialeigen(decomp)
    return lambda, X
end
```



My Experiences with Julia at PPPL

Pros

- Julia's mathematical syntax, custom functions, libraries, and packages.
- Stuart's Fortran pseudocode instructions were pretty easy for me to translate.
- Can do some data visualization in the same file.

Cons

- The documentation was not that helpful (for a first-time coder especially).
- The error messages were very difficult to digest and understand.



My First HPC Project: ORNL Summer 2023



RESEARCH-ARTICLE



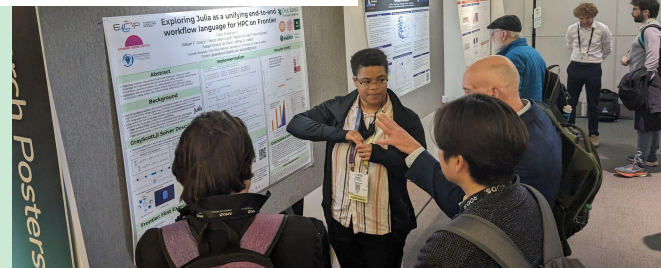
Julia as a unifying end-to-end workflow language on the Frontier exascale system

Authors: [William F. Godoy](#), [Pedro Valero-Lara](#), [Caira Anderson](#), [Katrina W. Lee](#), [Ana Gainaru](#), [Rafael Ferreira Da Silva](#),

[Jeffrey S. Vetter](#) [Authors Info & Claims](#)

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Conclusions

- Julia helps the scientific coding novice by having math friendly syntax, packages, and libraries.
- Julia allows non-experts to use HPC in a useful way for scientific applications.
- Internship programs are incredible opportunities for students (especially underrepresented) and greatly benefit the scientific community.



Thank you!

