

Stanford Stratified Structure Solver (S4) Simulation Tool

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The Stanford Stratified Structure Solver (S4) developed in 2012 allows for fast, accurate prediction of optical propagation through complex 3D structures. However, there have been two key challenges preventing wider use to date: the use of a specialized control language, and the difficulty of incorporating realistic materials parameters. In this project, both concerns have been addressed. We have constructed a graphical user interface as an alternative, using the open-source Rapture platform on nanoHUB. This has been combined with a comprehensive materials database known as PhotonicsDB, which incorporates materials optical data drawn from carefully vetted sources. An Octave script file was written to accept the user inputs and then generate and run an S4 control file. The results are then interpreted and displayed on the interface by the xml file. This new S4 GUI was then used to investigate and optimize selective solar thermal absorber designs, which can convert sunlight into heat for direct use in hot water, or for powering mechanical engines. Preliminary results are also presented.