

Abstract Submitted  
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**Strategies for Pile-up and Over-refinement to improve performance of the Surrogate Management Framework in cardiovascular flow optimization**<sup>1</sup> AEKAANSH VERMA, ALISON MARSDEN, Stanford University

— Engineering optimization problems are often limited by the cost of function evaluations. Furthermore, calculation of gradients in such problems can be expensive or even infeasible. Derivative free optimization methods such as variants of the Surrogate Management Framework (SMF) are suitable for such problems, and offer a well-established convergence theory. The SMF is comprised of a search step that is accelerated by a surrogate-based global search, typically using Kriging. Traditionally, Kriging-based SMF develop problems during the course of the optimization which affect both global and local search performance. We propose strategies to alleviate two such issues - pile-up of evaluations in a certain region in parameter space and improper refinement of the local search grid. We quantify the performance of these strategies on analytical test cases and discuss the mechanisms of improvement. Finally, we apply these strategies to some illustrative problems in cardiovascular blood flow simulations and growth and remodeling.

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