

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Surrogate-model Optimisation Strategies for non-Newtonian Gelling¹ ADAM KUTNAR, Imperial College London, LACHLAN MASON, Alan Turing Institute, UK, INDRANIL PAN, RICHARD CRASTER, OMAR MATAR, Imperial College London — Highly resolved simulations have advanced to the extent that they are routinely relied upon in engineering design. The trade-off for this accuracy, however, can be prohibitively high computational cost. These costs are further compounded when multiple calls to an expensive simulation code are required, for example when determining the optimal parameters for maximising an engineering performance metric. Here, simple strategies such as grid searching do not scale well with the number of optimisation parameter dimensions. In this study, we investigate industrial gelling phenomena for non-Newtonian fluids in eccentric annuli. The task is to minimise gelling under engineering constraints on both flow and geometric properties. We achieve computational tractability via a surrogate model optimisation strategy and demonstrate its benefits to industrial simulation practitioners, including a reduction in design lead times, by benchmarking against conventional grid and random sampling methods. Best practices are highlighted for a class of generic fluid dynamics optimisation problems

¹Royal Academy of Engineering; PETRONAS; EPSRC, UK; AI for Science and Government (Data-Centric Engineering Programme, The Alan Turing Institute, UK). Imperial College Research Fellowship for IP.

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Date submitted: 29 Jul 2019

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