FAST, NEAREST and Flagellar Regulation[1] MEURIG GAL-
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University of Birmingham — In an age where huge amounts of data can be readily
produced it is increasingly important to be able to accurately and efficiently analyse
large amounts of data, and to be able to use these analyses as a marker for clinical
outcome. However, semen analysis in the human is currently limited to meth- ods
such as sperm counting and analysis of fixed cells. To address this, we have devel-
oped and released FAST, a free-to-use package for the high-throughput detection
and tracking of large numbers of beating flagella in experimental microscopy videos.
This new ability to track the detailed flagellar waveform allows for more than just
measurements of motility. Alongside FAST we have been developing NEAREST,
an open source software enabling the rapid application of a meshless regularised
Stokeslet method to solve mobility and resistance problems in Stokes flow. Com-
bining FAST and NEAREST allows for detailed investigation into experimentally
intractable quantities such as energy dissipation, disturbance of the surrounding
medium and viscous stresses. Finally, we will discuss how the analysis capabilities
provided by these tools can be combined, together with models of the elastic be-
haviour of flagella and learning algorithms to probe the secrets of flagellar regulation
in swimming cells.

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Date submitted: 29 Jul 2019   Electronic form version 1.4