

WPI Mathematical Sciences Grants and Awards 2018-2019

High Strength Yarn Project, Analysis of Nanomaterials with Nanocomp Corporation

[Paffenroth, R.](#)

2018-2019 Amount: \$87,353

Bayesian Benchmarking of County Estimates for Agricultural Commodities Under Inequality constraints

Research and Development Division (RDD) at the National Agricultural Statistics Service (NASS), of the agencies of the USDA

[Nandram, B.](#)

2018-2019

The research involved builds on Professor Nandram's prior experience working with NASS on Objective Yield Survey and Interview Yield Survey for forecasting US corn yields. In professor Nandram's own description of the work: When the county estimates are obtained, they are benchmarked to district and state level estimates that are more reliable.

The next step is to incorporate inequality constraints into the Bayesian benchmarking procedure. When Farm Service Agency of the USDA provides earlier estimates of acreage,

and the county estimates provided by NASS must be larger than the FSA estimates such that the these

estimates must add up to the target (state estimate). This is a very

challenging small-area problem as the feasible region is tight. Some commodities we work on are corn, soybean, wheat. These estimates are useful for conservation and allocation of disaster relief.

Fractional PDEs (FPDEs) for Conservation Laws and Beyond

MURI Add-On Proposal (sub-award)

[Zhang, Z.](#)

September 1, 2018 - March 22, 2019 Amount: \$69,277

Non-Assistance Cooperative Agreement

USDA NASS RDD

[Nandram, B.](#)

2019-2020

Sarah Olson wins 2019 Mathematical Medicine & Biology Best Paper Prize

[Olson, S](#)

The winning paper was co-authored with Lucia Carichino (former WPI postdoctoral Scholar, now tenure track at RIT) and is titled "*Emergent three-dimensional sperm motility: coupling calcium dynamics and preferred curvature in a Kirchoff rod model*".

The journal Mathematical Medicine and Biology is managed by the Institute of Mathematics and its Applications (IMA) <https://ima.org.uk>, which is UK's chartered professional body for mathematicians and one of the UK's learned societies for mathematics. This journal publishes original articles with a significant mathematical content addressing topics in medicine and biology. It gives particular emphasis to papers exploiting modern developments in applied mathematics.

This best paper prize recognizes the **most outstanding research published in the journal over a two year period**, judged by a committee drawn from the Editorial Board.

In Sarah's own words: *This paper extended previous modeling techniques to examine fully three-dimensional sperm motility where internal force generation is coupled to the relevant biochemistry. We focused on understanding the role of calcium coupling on swimming patterns; emergent trajectories that can be characterized as a hypotrochoid are observed for quasi-planar beatforms, similar to experiments*