# Statement of Work – MCREX

The original ORNL budget allocation for this proposal was 433K. To meet funding demands we must readjust the work scope to fit within a 300K budget. Accordingly, we are removing the non-linear components of the work from the proposed project. The updated milestones for years 1, 2, and 3 are as follows:

**Year 1:** Demonstrate convergence properties and performance of MCSA algorithm on sparse symmetric and non-symmetric systems.

**Year 2:** Show resiliency of MCSA algorithm for soft and hard errors while solving the linear advection-diffusion-reaction (ADR) model problem.

**Year 3:** Show parallel performance of MCSA algorithm on existing HPC architectures and demonstrate scaling to exascale systems using the MCSA performance model.

The updated task list for each year is as follows:

|  |  |  |
| --- | --- | --- |
| 1 | Derive and implement linear ADR model equations for MCSA algorithm | Y1 |
| 2 | Investigate solver runtime parameters and performance for ADR model system | Y1, Y2 |
| 3 | Analyze robustness of unbiased estimators to high-variance events | Y1, Y2 |
| 4 | Implement MSOD parallel algorithm | Y2 |
| 5 | Develop performance model for MSOD/MCSA algorithm | Y2, Y3 |
| 6 | Model algorithm resiliency using fault injection campaigns | Y2, Y3 |
| 7 | Estimate algorithm performance on future systems using the performance model and xSim | Y3 |

The tasks that have been completely cut from the original proposal are:

* Implement Newton-MCSA method (Y1, Y2)
* Derive and implement non-linear, incompressible Navier-Stokes equations (Y1, Y2)

Additionally, we have reordered some tasks. Specifically, based on preliminary work by our graduate student, we have performance metrics for non-symmetric systems. Thus, in year 1 we will focus on developing the model ADR system upon which all future work will be based. This updated work statement is realistic with personnel and budgets. Furthermore, it accurately reflects the comments by reviewers.