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## Plan Overview

*A Data Management Plan created using DMPTool*

**Title:** Collaborative Research: A Novel Physics-Based Fluid-Solid Interaction Methodology

**Creator:** Karan Surana

**Affiliation:** University of Kansas (ku.edu)

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# Collaborative Research: A Novel Physics-Based Fluid-Solid Interaction Methodology

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## Roles and responsibilities

The Data Management Plan should outline the rights and obligations of all parties as to their roles and responsibilities in the management and retention of research data. It must also consider changes to roles and responsibilities that will occur should a principal investigator or co-PI leave the institution.

The data will be managed by the PI's lab (Computational Mechanics Laboratory [CML] and Cluster, University of Kansas). There are no additional costs associated with data management.

## Expected data

The Data Management Plan should describe the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project. It should then describe the expected types of data to be retained.

The data expected to be used will be commonly available material data for various solids and fluids. This data will be stored in text format and used in material models. Data resulting from numerical solutions of models will be in text format as well as images generated from the numerical data. All data will be stored in the CML computer system and cluster, with several backups kept. Depending on the number of test simulations analyzed, up to thirty different data sets may be generated, with up to 500 GB total data.

## Period of data retention

The Data Management Plan should describe the period of data retention. Minimum data retention of research data is three years after conclusion of the award or three years after public release, whichever is later. Public release of data should be at the earliest reasonable time. A reasonable standard of timeliness is to make the data accessible immediately after publication, where submission for publication is also expected to be timely. Exceptions requiring longer retention periods may occur when data supports patents, when questions arise from inquiries or investigations with respect to research, or when a student is involved, requiring data to be retained a timely period after the degree is awarded. Research data that support patents should be retained for the entire term of the patent. Longer retention periods may also be necessary when data represents a large collection that is widely useful to the research community. For example, special circumstances arise from the collection and analysis of large, longitudinal data sets that may require retention for more than three years. Project data-retention and data-sharing policies should account for these needs.

Data is expected to be retained for the life of the CML, at least ten years following publication of the results. Models and methodologies for data generation will be publicly available, so raw data and images can be regenerated in perpetuity.

## Data formats and metadata

The Data Management Plan should describe the specific data formats, media, including any metadata.

Input data for models is formatted for the FINESSE finite element system. Data is in ASCII text file. This input data includes material data, problem geometry, and boundary/initial conditions. Results for each analysis are stored in ASCII text files organized by column: the first columns being the independent variables and the final column being the computed dependent variable. A different output file is generated for every dependent variable. The results are not meaningful without the input data describing material, geometry, and conditions.

## Data dissemination and policies for public access, sharing and publication delays

The Data Management Plan should clearly articulate how "sharing of primary data" is to be implemented. It should describe dissemination approaches that will be used to make data available to others. Policies for public access and sharing should be described, including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements. Research centers and major partnerships with industry or other user communities must also address how data are to be shared and managed with partners, center members, and other major stakeholders. Publication delay policies (if applicable) must be clearly stated. Investigators are expected to submit significant findings for publication quickly that are consistent with the publication delay obligations of key partners, such as industrial members of a research center.

Data will be made publicly available as soon as possible through publication of results, likely beginning during the life of the grant. The publication will include the input data as well as output data in graphic form (i.e. images generated from numerical results). Due to the large size of the full data sets, full data will be made available on email request.

## Data storage and preservation of access

The DMP should describe physical and cyber resources and facilities that will be used for the effective preservation and storage of research data. In collaborative proposals or proposals involving sub-awards, the lead PI is responsible for assuring data storage and access.

The CML has a cluster with more than 200 TB of storage space with various redundancies and backups to secure long term storage of the data. Additionally, there are several devoted storage drives in the lab for additional protection of the data. Data will be kept for the life of the CML with access available upon request.