IFPRI BRIEF TEMPLATE

Check One: ☐**Project** ☐**Review** ☐**Collaboration**
☐**Workshop** ☒**Other**

This "Other" would represent a one-year project

Descriptive Title	From IFPRI advice to ASTM standard: Using Round Robin data to develop an ASTM standard for the calibration of DEM models
Working Title[1]	An ASTM Standard for DEM
Technical Area[2]	Characterization, Dry, Systems Engineering
Date	06/13/2023
Short Description	This brief is motivated by a recurring refrain from the IFPRI membership: **we need to make it easier for industry to use DEM – and easier use it *well***. The reliable calibration of DEM models is of importance to the particle-handling industries, both as a direct means of simulating industrial systems, and as an intermediary step in the development and/or calibration of continuum models of industrial systems. The IFPRI Round Robin has provided a stark illustration that there is much room for improvement in current calibration practices, highlighting the need for the development and dissemination of a standardized practice. The goal of this project is to use the outputs of the IFPRI Round Robin, combined with new data from additional industry-relevant systems, to **develop a first ASTM Standard for the calibration of DEM simulations of industrial systems**.
Objectives	(1) Validation of Best Practice on a wider range of industrial systems than directly explored in the Round Robin. (2) Extension of the best practice based on results of (1), if/as necessary. (3) Using the data from (1), development of less-general but easier- and faster-to-apply methods which can be applied to specific systems or groups of system. (4) Development of a detailed protocol to be adopted as an ASTM Standard for DEM calibration of industrial systems.

[1] Title used in meeting agendas and file archives
[2] One or more from the following list: W = wet systems; D = dry systems; F = particle formation; SR = size reduction; M = modeling; SE = systems engineering

Scope	**Objective 1:** The first goal of the project is to ensure (and rigorously document) the generality of the Best Practices developed on a still more comprehensive range of systems than utilized in the original Round Robin, using the same rigorous methodology. This will help us develop a strong "*precision and bias statement*", a crucial step to achieving ASTM certification. The proposed PI already has access to PEPT data pertaining to systems including fluidized and spouted beds, dry and wet mills, continuous blenders and twin-screw extruders, meaning that this objective can be efficiently completed within a short timescale. **Data for other systems of interest to the IFPRI membership can also be obtained upon request**. **Objective 2:** Based on the outcomes of Objective 1, the Best Practice can, if needed, be iteratively updated to account for the additional needs (if any) of the new systems tested. **Objective 3:** A significant theme highlighted by multiple IFPRI members is the desire for simpler methods requiring less equipment for the calibration of specific systems (as compared to the "general" calibration method, applicable to arbitrary systems, forming the main focus of Objective 1). The new data from Objective 1 and existing Round Robin data will be carefully analyzed to establish where and how reduced-complexity calibration methods can be successfully applied to certain systems and/or groups of systems. **Objective 4:** The end-goal of this project is to develop an ASTM Standard Practice based on the "Generalised" best practice established in Objectives 1/2 and the "Specialised" best practices established in Objective 3.

Recommended Contractors (2 or 3)		
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