Dear,

Below are the answers to the reviewer questions and suggestions. All changes made by the authors to the manuscript are entered in red font.

**Major Issues/Concerns:**

**1. Para. starting at line 63: As an expert in milling, I, similar to others, do not consider “breakage matrix methodology” as a separate method from population balance modeling (PBM). We consider it as a different formalism for the same conservation equation for particle population written in different forms (time-continuous vs. time-discretized, and index vs. matrix). Ref. [12] (already cited) establishes how breakage matrix (in square form) relates to standard equations of PBM. The authors should, at least, mention this perspective so that their paper fits into the wider context of comminution studies properly. It also helps authors to suggest that their Eq. (1) is 100% empirical and is devoid of any physical consideration.**

*Response:* The authors have changed the formulation of the breakage matrix methodology to be a time-discretized form of the PBM (line 72). Moreover, the authors have pointed out what is considered to be the time-continuous form of PBM (line 68).

**2.** **Para. starting at line 72: The authors must mention the limitation of the breakage matrix formalism, especially with a single breakage event, such as its inability to model retention type mills (e.g. ball mills). Such milling operations require either timewise or spatial (at steady-state) or both spatial and temporal sampling for which Eq. (1) is not applicable or it becomes superficial as Eq. (1) will have 0 predictive capability for such mills. In the same paragraph, it is important to note that the authors’ Eq. (1) is a “purely empirical” model with no mechanistic relevance, i.e., it is completely devoid of any physics and it does not even contain the fundamental concepts of particle breakage such as breakage probability and breakage distribution. Of course, per ref. [12], Eq. (1) is related to these fundamental concepts, but authors cut this connection by separating the breakage matrix formalism (“methodology”) from PBM. I am fine with the authors’ use of a USEFUL empirical model. But, these caveats must be explicitly mentioned.**

*Response:* The authors added a paragraph (starting at line 85) in which is thoroughly mentioned what is considered to be a limitation of the proposed modeling approach. Besides, two references have been added (reference 19 and 20).

**3. Line 85: This is not correct. Yet another negative consequence of disconnecting breakage matrix formalism from PBM. Please check and correct. It is only valid if and only if all particles are broken during the single breakage event, i.e., the breakage probability in a given input size class i is equal to 1. Please refer to E. Bilgili, M. Capece, “A Rigorous Breakage Matrix Methodology for Characterization of Multi-Particle Interactions in Dense-Phase Particle Breakage,” Chemical Engineering Research and Design, Vol. 90, 2012, pp. 1177–1188.**

*Response:* The authors have corrected the statement (lines 98 and 99) and added the required reference (line 100).

**4. Line 152: What was the purpose of conditioning? Why was moisture increased? Provide rationale.**

*Response:* The authors have added an explanation on the purpose of the condition treatment during the wheat flour milling process (lines 173-175).

**5. Conclusions: please indicate that the model is only applicable to non-retention mills with short residence time or wherein a single breakage event takes place.**

*Response:* The Conclusion has been supplemented with following sentence (lines 415-416):

“The model is applicable to non-retention mills with short residence time or wherein a single breakage event takes place.”

**Minor issues:**

**1. Please add a nomenclature section with the units of the variables–parameters.**

*Response:* The nomenclature section is created accordingly and submitted as a supplementary file named „Nomenclature“.

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| --- |
| Nomenclature |
| Notation |
| B | Breakage matrix  |
| f | Input size vector  |
| o | Output size vector  |
| Bij | The weight fraction of the size range j of the output materialobtained by milling the size range i of the input material |
| fj | The weight fraction of certain size fractions of the input |
| oi | The weight fraction of certain size fractions of the output |
| Y | Breakage matrix for predicting compositional distribution of output fractions |
| Yij | The weight fraction of certain compound in a corresponding output size fraction |
| P | Vector for describing content of some compound in the input fractions |
| Pj | Content of some compound in the input fractions |
| pi | Content of some chemical compound in the milling output size fractions |

**2. Please correct the typos and grammar mistakes on Lines 57, 61, 229, 343, 429.**

*Response:* Corrected accordingly.

**3. Lines 146, 147: Please give the sieve cuts more properly. What does ICC mean?**

*Response:* Sieve openings and obtained fractions are more preciously defined (lines 159-162). ICC stands for International Association for Cereal Science and Technology (former International Association for Cereal Chemistry). Explanation for ICC is provided in text (lines 164, 165) and modified in reference list (references 28 and 29).

**4. Some references look weird: right-aligned.**

*Response:* The authors have corrected reference to be left-aligned.