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A contact and sliding interface algorithm for the combined particle-element method

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Highlights

- A case is made, with examples, that conversion of elements to particles is a very powerful approach as accurate finite-element algorithms (including sliding) can be used together with meshless particle algorithms that include high distortions (Figure 2).
- The CPEM meshless particle approach (with EFG) is an improvement over the co-location GPA approach as it is consistent, does not experience tensile instabilities, and it more accurate for a wide range of applications. Reference is made to the earlier CPEM paper and examples are provided to illustrate this accuracy (Figures 5 and 6).
- The previous CPEM algorithm for contact experiences inaccuracies due to the interlocking which can occur after conversion (Figure 7).
- A new contact algorithm for CPEM is presented which eliminates the inaccuracy issues associated with interlocking (Figure 10).
- Example computations are provided for a ricocheting sphere on a deformable target (Figure 11). They clearly show the issues associated with the previous CPEM algorithm, and clearly show that the new contact algorithm eliminates these issues and provides essentially identical results as obtained with a finite element computation.
- Differences between the previous and new sliding/contact algorithm are also provided for an intact (elastic) projectile impacting a target that is highly distorted and requires conversion (Figure 12), and also for a condition where both the projectile and target experience severe distortions and require conversion (Figure 13).

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