# Conservative Rezoning of Domain Boundary in ALE Simulations

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The Arbitrary Lagrangian-Eulerian (ALE) method is very popular for simulation of phenomena with large-scale changes of volume and shape of the computational domain, such as the high-velocity impact problem. After the Lagrangian step, the mesh must be rezoned to preserve sufficient precision of further computation. Special care has to be taken of the boundary nodes, where an inadequate movement may lead to unwanted changes of domain shape and volume.

We suggest a method based on constrained numerical optimization, which adapts the mesh boundary while a priori preserving the volume of the entire domain and if possible also of the particular cells. The method tends to reduce the amount of quantities to be remapped between the meshes as low as possible. Several criteria of local mesh quality and their combinations are tested and studied.

The presented method can be also used as a boundary preprocessor for some of the existing techniques, such as Winslow smoothing or Reference Jacobian method. Also, since volume is preserved (completely or to a large extent), the same approach can be applied to treatment of the material interfaces.