A PARALLEL IMPLEMENTATION OF A DYNAMIC MESH APPROACH USING SUPERMESH

Horacio J. Aguerre\textsuperscript{a,b}, Santiago Márquez Damián\textsuperscript{a,c}, Juan M. Gimenez\textsuperscript{a,d} and Norberto M. Nigro\textsuperscript{a,d}

\textsuperscript{a}CIMEC, Centro de Investigación de Métodos Computacionales, UNL, CONICET, Colectora Ruta Nacional 168 s/n, Predio Conicet “Dr Alberto Cassano” 3000 Santa Fé, Argentina, aguerrehoracio@gmail.com

\textsuperscript{b}Universidad Tecnológica Nacional - Facultad Regional Concepción del Uruguay, (UTN-FRCU), Ing. Pereyra 676, 3260 Concepción del Uruguay, Argentina

\textsuperscript{c}Universidad Tecnológica Nacional - Facultad Regional Santa Fé, (UTN-FRSF), Lavaise 610, 3000 Santa Fé, Argentina

\textsuperscript{d}Universidad Nacional del Litoral - Facultad de Ingeniería y Ciencias Hídricas, (UNL-FICH), Ciudad Universitaria, 3000 Santa Fé, Argentina

Keywords: Parallel Computing, Non-conformal Interfaces, Supermesh, Conservative Interpolation, Finite Volume Method

Abstract. In dynamic mesh simulations or problems with complex geometries, it is useful to divide the domain into several parts to mesh them separately. As a result, mesh interfaces appear for each pair of subdomains that are interconnected. In this sense, subdomains must be coupled by an interpolation technique or by a remeshing procedure to solve the numerical problem. The interfaces may be non-conformal, and then, connectivity information is required. In parallel computing, communication must be performed if the interfaces are distributed over different processors. In the present work, the implementation of a parallelised strategy for a new interface technique, which is called pseudo-supermesh, is described. In the pseudo-supermesh strategy, a remeshing step is achieved which invalidates the original connectivity between the interfaces. As a consequence, the initial connectivity must be translated into the new mesh state where the interfaces may have a new topology. The present implementation is conceived to handle arbitrary decompose strategies. This feature is a significant advantage in the simulation of dynamic mesh problems, in particular for the simulation of rotating devices. A scalability test is performed using the proposed implementation with different decomposition methods. Finally, the robustness of the computational implementation is evaluated with industrial problems.