ANISOTROPIC ADAPTATION OF UNSTRUCTURED MESHES BY VERTEX REALLOCATION

Gustavo Ríos Rodríguez[a], Ezequiel López[b] and Mario A. Storti[a]

[a]*Centro Internacional de Métodos Computacionales en Ingeniería (CIMEC), Instituto de Desarrollo Tecnológico para la Industria Química (INTEC), Universidad Nacional del Litoral – CONICET Güemes 3450, 3000 Santa Fe, Argentina, http://www.cimec.org.ar*

[b]*Departamento de Mecánica Aplicada, Facultad de Ingeniería, Universidad Nacional del Comahue, CONICET, Buenos Aires 1400, 8300-Neuquén, Argentina e-mail: ezequiel.jose.lopez@gmail.com*

Abstract. Mesh adaptation is widely used to solve CFD problems both on structured and unstructured meshes. It allows to improve the accuracy of the numerical solution while keeping bounded the usage of computational resources. Anisotropic mesh adaptation proves to be more efficient than the isotropic one if the problem solution is anisotropic in nature, as it usually happens in gasdynamic problems with shock waves and contact discontinuities. In this work we propose an anisotropic mesh adaptation strategy that reallocates the vertices of an unstructured mesh (r-adaptation). Vertices are moved in accordance to an anisotropic metric map generated by the Hessian of the numerical solution. The Hessian matrix is recovered by a least-square approximation. The strategy is evaluated on test cases for triangle meshes and a typical gasdynamic problem for inviscid flows.