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A METHOD FOR CURVATURE CALCULATION IN THREE-DIMENSIONAL VOLUME OF FLUID PROBLEMS ON NON-STRUCTURED MESHES

Santiago Márquez Damián[a,b], **Cesar I. Pairetti**[c] **and Norberto M. Nigro**[a,d]

[a]*Research Center for Computational Methods (CIMEC),CONICET/UNL, Predio CONICET Santa Fe - Colectora Ruta Nac Nro 168, Paraje El Pozo, Santa Fe, Argentina santiagomarquezd@gmail.com, http://www.cimec.org.ar*

[b]*Universidad Tecnológica Nacional, FRSF, Lavaise 610, Santa Fe, Argentina http://www.frsf.utn.edu.ar/*

[c]*Facultad de Ciencias Exactas, Ingeniería y Agrimensura, UNR, Av. Pellegrini 250 - Planta Baja, Rosario, Argentina http://web.fceia.unr.edu.ar/ - CONICET*

[d]*Facultad de Ingeniería y Ciencias Hídricas, UNL, Ciudad Universitaria. Ruta Nacional Nro 168 Paraje El Pozo, Santa Fe, Argentina http://www.fich.unl.edu.ar/*

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Abstract. The calculation of curvature from Volume of Fluid data has been a challenging task for many years since part of the information about of free-surface shape is lost in the averaging process of the indicator function. This calculation is crucial for the correct computing of interfacial forces present in micro-drop mechanics, capillary flows, flow in porous media and many others. Regarding the available methods one the most widespread techniques is the Continuum Surface Force (CSF) based on the calculation of the curvature using the second derivative of the fraction distribution or an smoothed version of this field to avoid spurious forces. Another techique is the Reconstructed Distance Function (RDF) where the curvature is computed as the second derivative of the distance to the interface. Both methods have been proposed for structured meshes and have extensions to non-structured cases. Within the most accurate methods are the Height Fuctions initially presented in structured meshes and lately extended to the general two dimensional case by Ito et al. [J. of Comp. Phys. 273 (2014) 38-53]. In this context this work presents an extension of Ito's method to three dimensions being able to run in parallel facilities.