

## MODELIZACIÓN DE OLEAJE 2D CON TÉCNICA “SMOOTHED PARTICLE HYDRODYNAMICS (SPH)”

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**Keywords:** DualSPHysics, modelo físico, modelo numérico de partículas, canal de oleaje.

**Abstract.** Se presenta el modelo Dual Smoothed Particle Hydrodynamics – SPH (Hidrodinámica de Partículas Suavizadas) para examinar la propagación de olas regulares e irregulares y su interacción con distintas condiciones de contorno en un canal de oleaje bidimensional.

Se compararon los resultados con la modelación de la propagación de una ola monocromática a lo largo del canal de oleaje vidriado existente en el Laboratorio de Hidráulica. Se simuló el movimiento de la pala generadora de oleaje y la propagación de este oleaje a lo largo de los primeros 13 m de longitud del canal compuesto por un tramo recto y una playa rectilínea.

El método SPH es una aproximación lagrangiana capaz de brindar buenas precisiones en la simulación de grandes deformaciones de superficies libres. El modelo se validó con los datos experimentales, y se observó una buena similitud entre modelo físico y numérico.

El modelado con SPH actualmente proporciona una herramienta prometedora en la predicción de la transformación de diferentes ondas como en la interacción con distintos objetos.

## 1 INTRODUCTION

This document provides information and instructions for preparing an article according to the AMCA style. Only articles formatted according to the present guidelines will be accepted for AMCA publications.

## 2 GENERAL SPECIFICATIONS

The article may be written in English, Spanish or Portuguese within a printing box of 16cm x 24cm, centered in the page. The paper including figures, tables and references must have a minimum length of 4 pages and must not exceed 25 pages. The size of the PDF file of the paper must not exceed 2 MBytes.

### 2.1 Use of acronyms

If acronyms are used, then define them before their first occurrence.

## 3 TITLE, AUTHORS, AFFILIATION, KEYWORDS

The first page must contain the Title, Author(s), Affiliation(s), Keywords and the Abstract. The second page must begin with the Introduction. The first line of the title is located 3cm from the top of the printing box.

### 3.1 Title

The title should be written centered, in 14pt, boldface Times Roman, all capital letters. It should be single spaced if the title is more than one line long. Inclusion of formulas or special characters in the title is **highly** discouraged. Acronyms may be used if defined *in-line*, for instance “Large Eddy Simulation (LES) of flow around a cylinder”.

### 3.2 Author

The author’s name should include first name, middle initial and last name. It should be written centered, in 12pt boldface Times Roman, 12pt below the title. Put all the authors together, split in several lines if necessary. Affiliations must be arranged in centered blocks, after the authors. Identify each author with its corresponding affiliation using a letter superscript, as in the example. If all the authors belong to the same affiliation do not use superscript.

### 3.3 Affiliation

Author’s affiliation should be written centered, in 11pt Italic Times Roman, 12pt below the list of authors. A 12pt space should separate two different affiliations. It is recommended that authors include an e-mail address and a web page per affiliation site, if possible.

### 3.4 Keywords

Please, write no more than six keywords. They should be written left aligned, in 12pt Times Roman, and the line must begin with the words **Keywords** boldfaced (use **Palabras Clave** in Spanish and **Palavras Chave** in Portuguese). A 12pt space should separate the keywords from the affiliations.

### 3.5 Abstract

Use 11pt Times Roman for the abstract. The word **Abstract** must be set in boldface, not italicized, at the beginning of the first line (use **Resumen** for Spanish and **Resumo** for Portuguese). The abstract text should be justified and separated 12pt from the keywords, as shown in the first page of these instructions. The abstract should be self-contained, so do not include figures, tables or equations in the abstract. Neither include any reference to such material. It is discouraged to include references to other work in the abstract. In case of including any references, then they should be included *in-line* but abbreviated, as in this example (C. Jhonson et al., *Int J Num Meth Eng*, 34(3):543-568 (1992); D. Mitchell and J. Brady, *J Sound Vib*, 21(2):221–230 (2006)). Multiple citations should be separated by semi-colons. **It is strongly discouraged to include more than 2 references in the abstract.** Inclusion of formulas is **highly** discouraged. Avoid special characters. If acronyms are used, then define them before their first occurrence.

## 4 HEADINGS

### 4.1 Main headings

The main headings should be written left aligned, in 12pt, boldface and all capital Times Roman letters. There should be a 12pt space before, and 6pt after the main headings.

### 4.2 Secondary headings

The secondary headings should be written left aligned, in 12pt, boldface Times Roman, with an initial capital for first word only. There should be a 12pt space before, and 6pt after the secondary headings.

## 5 TEXT

The normal text should be written single-spaced, justified, using 12pt Times Roman in one column. The first line of each paragraph must be indented 0.5cm. There is not inter-paragraph spacing.

## 6 PAGE NUMBERS

The authors **must not number** the pages of the article. Numbers will be added by the editor/publisher.

## 7 FIGURES

All figures should be numbered consecutively and captioned. The caption should be written centered, in 10pt Times Roman, upper and lower case letters.

A 6pt space should separate the figure from the caption, and a 12pt space should separate the upper part of the figure and the bottom of the caption from the surrounding text (see [Figure 1](#)). Figures should be referenced in the text. Color figures are welcomed.

## 8 EQUATIONS

A displayed equation is numbered, using Arabic numbers in parentheses. It should be centered, leaving a 6pt space above and below to separate it from the surrounding text.

The following example is a simple single line equation

$$Ax = b. \tag{1}$$

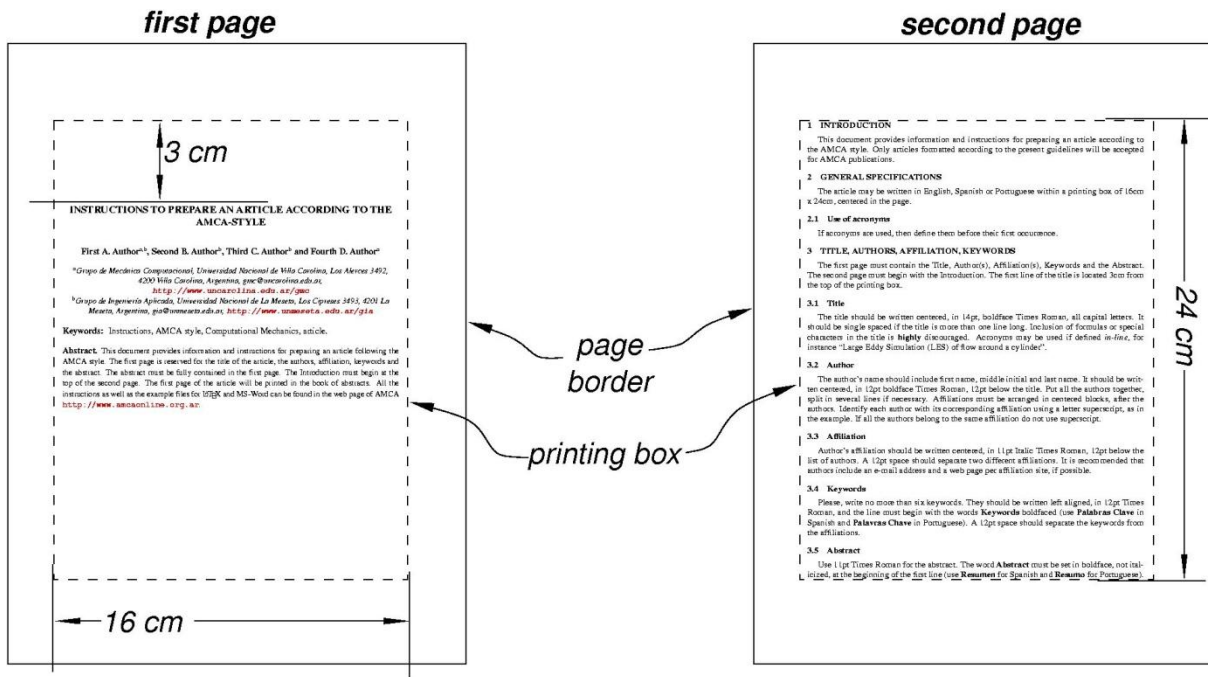


Figure 1: Page Layout

The next example is a multi-line equation

$$\begin{aligned} Ax &= b, \\ Ay &= c. \end{aligned} \tag{2}$$

If possible, internal PDF links must be generated for references to equations. The recommended color for links to references in the text is blue (e.g., see Eq. (2)).

## 9 TABLES

All tables should be numbered consecutively and captioned; the caption should be 10pt Times Roman, upper and lower case letters.

A space of 6pt separates the table from the caption, and 12pt space separates the table from the surrounding text. For an example, see [Table 1](#). Tables should be referenced in the text.

	20x20 mesh	50x50 mesh	100x100 mesh
0	41.00	1.00	4.92
1	40.86	1.02	4.88
10	23.81	3.44	2.92
50	5.62	64.20	1.08

Table 1: Condition number for the Stekhlov operator.

## 10 FORMAT OF REFERENCES

References should be quoted in the text using the *author-style* (a.k.a. *Harvard style*). References can be cited in *parenthetical* form ([Zienkiewicz and Taylor, 1991](#); [Idelsohn and Oñate, 1994](#); [Meyer et al. 1995b, a](#)), or in *textual* form, e.g. see [Zienkiewicz and Taylor \(1991\)](#); [Idelsohn and Oñate \(1994\)](#); [Meyer et al. \(1995b, a\)](#). References are grouped together and sorted alphabetically at the end of the article as shown in these instructions. Do not include references that are not cited in the article body.

If possible, internal PDF links must be generated for citations. The recommended color for links to references in the text is blue. The preferred color for links to external references, as web pages, is red (e.g. <http://www.amcaonline.org.ar>).

## 11 CONCLUSIONS

Template files in TeX, L<sup>A</sup>T<sub>E</sub>X and MS-Word may be found at the AMCA web site: <http://www.amcaonline.org.ar>. Remember: **Do not number the pages.**

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