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A Demonstration of the LaTeX 2ε Class File for the Journal of Mathematical Study

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Abstract. This paper describes the use of the LaTeX 2ε jms.cls class file for setting papers for the *Journal of Mathematical Study*.

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1 Introduction

This paper is described how to use the jms.cls class file for publication in the *Journal of Mathematical Study*. The jms.cls class file preserves much of the standard LaTeX 2ε interface so that authors can easily convert their standard LaTeX 2ε article style files to the jms style.

2 Preparation of Manuscript

The Title Page should contain the article title, authors' names and complete affiliations, and email addresses of all authors. The Abstract should provide a brief summary of the main findings of the paper.

References should be cited in the text by a number in square brackets. Literature cited should appear on a separate page at the end of the article and should be styled and punctuated using standard abbreviations for journals (see Thomson ISI list of journal abbreviations). For unpublished lectures of symposia, include title of paper, name of sponsoring society in full, and date. Give titles of unpublished reports with "(unpublished)" following the reference. Only articles that have been published or are in press

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3 Mathematical Formulas (Examples)

In [1] it was claimed that there always exists a minimizer; however, the statement of Theorem 2.1 is incomplete. In this note we present the full statement, with a detailed proof.

The theorem stated in [1] holds as long as the number of electrons is below a certain critical value. The correct statement for the theorem in [1] is:

Theorem 3.1 (Existence of minimizers). *Given* $v \in C^\infty(\overline{\Omega})$, *and* $K_{WT} \in L^2_{loc}(\mathbb{R}^3)$, *consider the problem*

$$\inf_{u\in\mathcal{B}} F[u], \tag{3.1}$$

where F *and* $\mathcal{B}$ *are*

$$\begin{aligned} F[u] = & \frac{1}{2}\int_\Omega |\nabla u|^2 - \frac{7C_{TF}N^{2/3}}{25}\int_\Omega u^{10/3} + \frac{4C_{TF}N^{2/3}}{5}\int_\Omega |u|^{5/3}\left(K_{WT} * |u|^{5/3}\right) \\ & + \frac{N}{2}\int_\Omega u^2\left(\frac{1}{|\mathbf{x}|} * u^2\right) - \frac{3}{4}\left(\frac{3N}{\pi}\right)^{1/3}\int_\Omega u^{8/3} \\ & + \int_\Omega u^2 \varepsilon(Nu^2) + \int_\Omega v(\mathbf{x}) u^2(\mathbf{x})\, d\mathbf{x}, \end{aligned} \tag{3.2}$$

and

$$\mathcal{B} = \left\{ u \in H_0^1(\Omega) \,\middle|\, u \geq 0,\ \int_\Omega u^2 = 1 \right\}. \tag{3.3}$$

In (3.2)*, the set* Ω *is open and bounded, and star-shaped with respect to* 0*;* ε *is defined as*

$$\varepsilon(Nu^2)=\begin{cases} \dfrac{\gamma}{1+\beta_1\sqrt{r_s}+\beta_2 r_s}, & r_s\geq 1, \\ A\ln(r_s)+B+Cr_s\ln(r_s)+Dr_s, & r_s\leq 1, \end{cases} \tag{3.4}$$

where $r_s=\left(4\pi Nu^2/3\right)^{-\frac{1}{3}}$*; the parameters used are* $\gamma=-0.1423$*,* $\beta_1=1.0529$*,* $\beta_2=0.3334$*,* $A=0.0311$*,* $B=-0.048$*, and* $C=2.019151940622\times 10^{-3}$ *and* $D=-1.163206637891\times 10^{-2}$ *are chosen so that* $\varepsilon(r)$ *and* $\varepsilon'(r)$ *are continuous at* $r=1$*.*

Then, there exists $N_0>0$ *such that:*

1. *If* $N<N_0$ *then* $\exists u^*\in\mathcal{B}$ *such that*

$$F[u^*]=\min_{u\in\mathcal{B}}F[u]. \tag{3.5}$$

2. *If* $N>N_0$ *then*

$$\inf_{u\in\mathcal{B}}F[u]=-\infty. \tag{3.6}$$

Proof. The second part of the theorem was proved in [2, 3]. We outline the proof here for completeness. Since $0\in\Omega$, $\exists\delta_0>0$ such that $B(0,\delta_0)\subset\Omega$. Consider a compactly supported function $u_0\in C_0^\infty(B(0,1))$, such that

$$\int_{\mathbb{R}^3}u_0^2=1, \tag{3.7}$$

and consider the rescaling

$$u_\delta(\mathbf{x})=\frac{1}{\delta^{3/2}}u_0\left(\frac{\mathbf{x}}{\delta}\right),\quad 0<\delta<\delta_0. \tag{3.8}$$

Then $u_\delta\in\mathcal{B}$, and

$$F[u_\delta]=\frac{1}{\delta^2}\left(\frac{1}{2}\int_\Omega|\nabla u_0|^2-\frac{7C_{TF}N^{2/3}}{25}\int_\Omega u_0^{10/3}\right)+\mathcal{O}\left(\frac{1}{\delta}\right). \tag{3.9}$$

Define

$$A_0=\inf_{u\in H_0^1(\Omega),\ \|u\|_2=1}\frac{\int_\Omega|\nabla u|^2}{\int_\Omega u^{10/3}}>0. \tag{3.10}$$

Then if $A_0/2<7C_{TF}N^{2/3}/25$, we can choose u_0 so that the leading term in (3.9) is negative, and when $\delta\to 0$, the desired result follows.

For the existence of minimizers, assume that N is such that $A_0/2>7C_{TF}N^{2/3}/25$. By Lemma 3.1, there exist $C>0$, $\delta>0$ such that

$$\begin{aligned} F[u]&\geq\frac{1}{2}\int_\Omega|\nabla u|^2-\left(\frac{7C_{TF}N^{2/3}}{25}+\delta\right)\int_\Omega u^{10/3}-C \\ &\geq\left(\frac{1}{2}-\frac{1}{A_0}\left(\frac{7C_{TF}N^{2/3}}{25}+\delta\right)\right)\int_\Omega|\nabla u|^2\geq\tau\int_\Omega|\nabla u|^2-C, \end{aligned} \tag{3.11}$$

where $\tau > 0$. Therefore the functional is coercive, and the result follows from now from standard arguments in the Calculus of Variations, involving the Sobolev Embedding, and the Rellich-Kondrachov compactness theorem. □

4 Header Information

The heading for any file using ata.cls is like this;

```
\documentclass[mathpazo]{jms}

\begin{document}

\title{Make the Title in Title Case}

\author[An Author et.~al]{First Author\affil{1},
Second Author\affil{2}\comma\corrauth
and Third Author\affil{1}}

\address{\affilnum{1}\ Address for first and third authors \\
\affilnum{2}\ Address for second author}

\emails{{\tt ata@global-sci.org} (A.~Author), {\tt
second@author.email} (S.~Author), {\tt third@author.email}
(T.~Author)}

\begin{abstract}
Text here, no equation, no citation, no reference.
\end{abstract}

\ams{list here}
\clc{list here}
\keywords{list here}

\maketitle

\section{First Section}

\end{document}
```

5 Some Remarks

5.1 Mathematics

jms.cls makes the full functionality of $\mathcal{A}\mathcal{M}\mathcal{S}$TEX available. We encourage the use of the align, gather and multline environments for displayed mathematics.

5.2 Cross-referencing

The use of the LATEXcross-reference system for figures, tables, equations and citations is encouraged.

Acknowledgments

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References

[1] García-Cervera C J, An efficient real space method for orbital-free density-functional theory, Commun. Comput. Phys., 2(2) (2007), 334-357.
[2] Blanc X and Cancès E, Nonlinear instability of density-independent orbital-free kinetic-energy functionals, J. Chem. Phys., 122 (2005), 214106.
[3] Blanc X and Cancès E, Technical report, http://www.ann.jussieu.fr/publications/2005/R05014.pdf, 2005.