Proceedings Trim Size: 9in x 6in
Text Area: 7.35in (include runningheads) x 4.5in
Main Text is 10/13pt

For Half-Title Page (prepared by publisher)

Publishers' page — (Blank page)

For Full Title Page (prepared by publisher)

For Copyright Page (prepared by publisher)

PREFACE

The *Tenth International Conference on Recent Progress in Many-Body Theories* (RPMBT-10) was held at the University of Washington in Seattle, USA during the period 10–15 September, 1999. The present volume contains the texts of most of the invited talks delivered at the conference and a selection from among the many poster presentations.

The general format and style of the conference followed the accepted and well-developed pattern for the series, focusing on the development, refinement and important applications of the techniques of quantum many-body theory. The intention of the series has always been to cover in a broad and balanced fashion both the entire spectrum of theoretical tools developed to tackle the quantum many-body problem and their major fields of application. One of the main aims of the series is to foster the exchange of ideas and techniques among physicists working in such diverse areas of applications of many-body techniques as nuclear and subnuclear physics, astrophysics, atomic and molecular physics, quantum chemistry, complex systems, quantum field theory, strongly correlated electronic systems, magnetism, quantum fluids and condensed matter physics.

Quantum many-body theory as a discipline in its own right dates largely from the 1950's, and is hence in many senses already a mature subject. Despite this apparent maturity the field remains vibrant and active, vigorous and exciting, vital and important. Indeed, the successes, importance and vitality of the field have very clearly been recognized by the sharing of the 1998 Nobel Prizes in both Physics and Chemistry by the many-body theorists Robert Laughlin, Walter Kohn and John Pople. It is a source of great pleasure to all of us who work in quantum many-body theory that important achievements in our subject have been thus recognized at the very highest level. We were also especially delighted that two of these then most recent Nobel Laureates, Kohn and Laughlin, accepted invitations to deliver keynote lectures at RPMBT-10...

In any event, the Local Organizing and Programme Committees deserve great thanks in creating a well-run and productive meeting, with an exciting programme of talks and poster presentations. It is a pleasure to thank all of them for their hard work, especially Aurel Bulgac who, as Chairman, has led and guided them throughout.

R.F. Bishop
(Chairman, International Advisory Committee for the Series of International Conferences on Recent Progress in Many-Body Theories)

Manchester, U.K.
31 December 1999

ORGANIZING COMMITTEES

SERIES EDITORIAL BOARD

for the Series on Advances in Quantum Many-Body Theory

INTERNATIONAL ADVISORY COMMITTEE

for the Series of International Conferences on
Recent Progress in Many-Body Theories

CONTENTS

FOR PROCEEDINGS EDITORS:
COMBINING CONTRIBUTIONS USING WS-PROCS9x6 MASTER DOCUMENT IN LATEX2e

First Author

World Scientific Publishing Co, Production Department,
5 Toh Tuck Link, Singapore 596224,
E-mail: wspc@wspc.com.sg

ws-procs9x6.tex is the master file to input all the papers from front matter, body and end matter files.

Keywords: Master file; LATEX; Proceedings; World Scientific Publishing.

1. Master File

All the subdocuments are arranged in this master file in the following sequence:

```
%\documentclass[draft]{ws-procs9x6}
\documentclass{ws-procs9x6}
\usepackage{ws-toc,ws-multind}
\makeindex{author}                  %to invoke author index
\begin{document}
\titlepages
\input preface.tex
\cleardoublepage
\include organizers.tex
\mastertoc
%\part{Part Title}{}                %optional part title
\include{proc1}
\include{proc2}
%\part{Second Part}{}               %optional part title
\include{proc3}
\printindex{author}{AUTHOR INDEX}   %to print Author Index
\end{document}
```

2. Pagination

Pages i–iv are always the same and are prepared by the publisher. The pagination of the rest of the front matter depends on the length of the various sections (preface, organizing committee's text, contents). Each front matter section should start on an odd right-hand page. The following is an example of proceedings pagination:

(i) Front matter:

page i	—	half-title page, prepared by publisher
page ii	—	blank page
page iii	—	full-title page, prepared by publisher
page iv	—	copyright page, prepared by publisher
pages v–ix	—	preface text
page xi	—	organizing committees text
pages xiii–xx	—	contents text (TOC)

The first available front matter page is page v.

(ii) Body text:
odd page — First article, followed by remaining articles

(iii) Back matter (optional):
odd page — participants list

Back matter text must start on an odd page.

If the organization of the contributors' manuscripts is different from the above pagination guidelines, please e-mail the respective desk-editor for advice.

3. Running Head

Preparation of the running head is optional. The following describes how it should be done.

Each contribution must have `\markboth` at the preamble to set the running head:

```
\markboth{Author's Name on Even Page}
         {Article Title on Odd Page}
```

Table 1. This table shows how the author names should appear in running head and TOC depending upon the number of authors contributing that paper.

No. of Authors	Author Names
1	L. Hatcher
2	I. A. Pedrosa & I. Guedes
3	B. Feng, X. Gong & X. Wang
4 and more	S. R. Choudhury *et al.*

Note: For TOC and Running Heads, the author names should appear in initial and surname format, e.g. LEE HATCHER should be abbreviated as L. HATCHER.

4. Author Index

To create an “author” index, the following declarations should be included in the master TEX file:

```
\makeindex{author}      % in the preamble to invoke author index
\printindex{author}{AUTHOR INDEX} % at end to print author index
```

In text, the author index entries are marked with:
`\index{autor}{entry}` or `\aindx{entry}`

5. Compiling the Master File in LaTeX2e

To complete the job, compile your file as follows:

(1) latex ws-procs9x6
(2) latex ws-procs9x6
(3) bibtex proc2 `% Chapters using BIBTEX database should`
`% be compiled individually in ‘bibtex’.`
(4) makeindex author `% author index`
(5) latex ws-procs9x6
(6) latex ws-procs9x6

6. Master TOC

Each contribution must have `\wstoc{#1}{#2}` at the preamble to create the combined table of contents:

```
\wstoc{Article Title}{Author’s Name}
```

7. Preparing the Individual Contributions for Combining

The following highlighted changes should be made in all the contributions provided by the individual contributors before including them in the master document.

Contribution provided by an individual contributor:	Modified contribution, ready to get included in the master document:
%proc1.tex	%proc1.tex
\documentclass{ws-procs9x6}	\markboth{A. Author}{Paper Title}
\begin{document}	\wstoc{Paper Title}{A. Author}
\title{PAPER TITLE}	\title{PAPER TITLE}
\author{A. AUTHOR}	\author{A. AUTHOR}
	\aindx{Author, A.}
\address{Institute of ...}	\address{Institute of ...}
\begin{abstract}	\begin{abstract}
We search for ...	We search for ...
\end{abstract}	\end{abstract}
\keywords{Keyword1; ...}	\keywords{Keyword1; ...}
\bodymatter	\bodymatter
\section{Introduction}	\section{Introduction}
String theory ...	String theory ...
\begin{thebibliography}{00}	\begin{thebibliography}{00}
\bibitem{t1} A. Sen, ...	\bibitem{t1} A. Sen, ...
\bibitem{t2} P. Horava, ...	\bibitem{t2} P. Horava, ...
...	...
\end{thebibliography}	\end{thebibliography}
%for BiBTeX users	%for BiBTeX users
%\bibliographystyle{ws-pro...}	%\bibliographystyle{ws-pro...}
%\bibliography{sample}	%\bibliography{sample}
\end{document}	\vfill
	\pagebreak

References

1. L. Lamport, *LaTeX, A Document Preparation System.* (Addison-Wesley, Reading, MA, 1994), 2nd edition.
2. L. Lamport, *Make Index: An Index Processor For LaTeX*, (1987).

FOR PROCEEDINGS CONTRIBUTORS:
USING WORLD SCIENTIFIC'S WS-PROCS9X6 DOCUMENT CLASS IN LATEX2e

A. B. AUTHOR* and C. D. AUTHOR

University Department, University Name,
City, State ZIP/Zone, Country
**E-mail: ab_author@university.com*
www.university_name.edu

A. N. AUTHOR

Group, Laboratory, Street,
City, State ZIP/Zone, Country
E-mail: an_author@laboratory.com

This article explains how to use World Scientific's ws-procs9x6 document class written in LATEX2e. This article was typeset using ws-procs9x6.cls and may be used as a template for your contribution.

Keywords: Style file; LATEX; Proceedings; World Scientific Publishing.

1. Using Other Packages

The class file loads the packages `amsfonts`, `amsmath`, `amssymb`, `chapterbib`, `cite`, `dcolumn`, `epsfig`, `rotating` and `url` at startup. Please try to limit your use of additional packages as they often introduce incompatibilities. This problem is not specific to the WSPC styles; it is a general LATEX problem. Check this article to see whether the required functionality is already provided by the WSPC class file. If you do need additional packages, send them along with the paper. In general, you should use standard LATEX commands as much as possible.

2. Layout

In order to facilitate our processing of your article, please give easily identifiable structure to the various parts of the text by making use of the usual LATEX commands or by using your own commands defined in the preamble, rather than by using explicit layout commands, such as `\hspace, \vspace, \large, \centering`, etc. Also, do not redefine the page-layout parameters. For more information on layout and font specifications, please refer to our `Layout and Font Specification Guide`.

3. User Defined Macros

User defined macros should be placed in the preamble of the article, and not at any other place in the document. Such private definitions, i.e. definitions made using the commands `\newcommand, \renewcommand, \newenvironment` or `\renewenvironment`, should be used with great care. Sensible, restricted usage of private definitions is encouraged. Large macro packages and definitions that are not used in this example article should be avoided. Please do not change the existing environments, commands and other standard parts of LaTeX.

4. Using WS-procs9x6

You can obtain these files from the following website: `http://www.wspc.com.sg/style/proceedings_style.shtml` and `http://www.icpress.co.uk/authors/stylefiles.shtml#proceedings`.

4.1. *Input used to produce a paper*

```
\documentclass{ws-procs9x6}
\begin{document}
\title{FOR PROCEEDINGS CONTRIBUTORS: ...}
\author{A. B. AUTHOR$^*$ and C. D. AUTHOR}
\address{University Department, ...}
\author{A. N. AUTHOR}
\address{Group, Laboratory, Street, ...}
\begin{abstract}
This article explains how to ...
\end{abstract}
\keywords{Style file; \LaTeX, ...}
\bodymatter
\section{Using Other Packages}
The class file has ...
\bibliographystyle{ws-procs9x6}
\bibliography{ws-pro-sample}
\end{document}
```

5. Sectional Units

Sectional units are obtained in the usual way, i.e. with the LaTeX commands `\section`, `\subsection`, `\subsubsection` and `\paragraph`.

6. Section

This is just an example.

6.1. *Subsection*

This is just an example.

6.1.1. *Subsubsection*

This is just an example.

Paragraph This is just an example.

Unnumbered Section

Unnumbered sections can be obtained by using `\section*`.

7. Lists of Items

Lists are broadly classified into four major categories that can randomly be used as desired by the author:

(a) Numbered list.
(b) Lettered list.
(c) Unnumbered list.
(d) Bulleted list.

7.1. *Numbered and lettered list*

(1) The `\begin{arabiclist}[]` command is used for the arabic number list (arabic numbers appearing within parenthesis), e.g., (1), (2), etc.
(2) The `\begin{romanlist}[]` command is used for the roman number list (roman numbers appearing within parenthesis), e.g., (i), (ii), etc.
(3) The `\begin{Romanlist}[]` command is used for the cap roman number list (cap roman numbers appearing within parenthesis), e.g., (I), (II), etc.

(4) The `\begin{alphlist}[]` command is used for the alphabetic list (alphabets appearing within parenthesis), e.g., (a), (b), etc.
(5) The `\begin{Alphlist}[]` command is used for the cap alphabetic list (cap alphabets appearing within parenthesis), e.g., (A), (B), etc.

Note: For all the above mentioned lists (with the exception of alphabetic list), it is obligatory to enter the last entry's number in the list within the square bracket, to enable unit alignment.

7.2. *Bulleted and unnumbered list*

The `\begin{itemlist}` command is used for the bulleted list.

The `\begin{unnumlist}` command is used for creating the unnumbered list with the turnovers hangindent by 1 pica.

Lists may be laid out with each item marked by a dot:

- item one
- item two
- item three.

Items may also be numbered with lowercase Roman numerals:

(i) item one
(ii) item two
    (a) lists within lists can be numbered with lowercase Roman letters
    (b) second item.
(iii) item three
(iv) item four.

8. Theorems and Definitions

Input:

```
\begin{theorem}
We have $\# H^2 (M \supset N) < \infty$ for an inclusion ...
\end{theorem}
```

Output:

Theorem 8.1. *We have $\#H^2(M \supset N) < \infty$ for an inclusion $M \supset N$ of factors of finite index.*

Input:

```
\begin{theorem}[Longo, 1998]
For a given $Q$-system...
\[
N = \{x \in N; T x = \gamma (x) T, T x^* = \gamma (x^*) T\},
\]
and $E_\Xi (\cdot) = T^* \gamma (\cdot) T$ gives ...
\end{theorem}
```

Output:

Theorem 8.2 (Longo, 1998). *For a given Q-system...*

$$N = \{x \in N; Tx = \gamma(x)T, Tx^* = \gamma(x^*)T\},$$

and $E_\Xi(\cdot) = T^*\gamma(\cdot)T$ gives a conditional expectation onto N.

The following environments are available by default with WSPC document styles:

Environment	Heading	Sample output
`algorithm`	Algorithm	**Algorithm 1.1.** This is a test.
`answer`	Answer	**Answer 1.1.** This is a test.
`assertion`	Assertion	**Assertion 1.1.** This is a test.
`assumption`	Assumption	**Assumption 1.1.** This is a test.
`case`	Case	**Case 1.1.** This is a test.
`claim`	Claim	**Claim 1.1.** *This is a test.*
`comment`	Comment	**Comment 1.1.** This is a test.
`condition`	Condition	**Condition 1.1.** This is a test.
`conjecture`	Conjecture	**Conjecture 1.1.** *This is a test.*
`convention`	Convention	**Convention 1.1.** This is a test.
`corollary`	Corollary	**Corollary 1.1.** *This is a test.*
`criterion`	Criterion	**Criterion 1.1.** This is a test.
`definition`	Definition	**Definition 1.1.** This is a test.
`example`	Example	**Example 1.1.** This is a test.
`lemma`	Lemma	**Lemma 1.1.** *This is a test.*
`notation`	Notation	**Notation 1.1.** This is a test.
`note`	Note	**Note 1.1.** This is a test.
`observation`	Observation	**Observation 1.1.** This is a test.
`problem`	Problem	**Problem 1.1.** *This is a test.*
`proposition`	Proposition	**Proposition 1.1.** *This is a test.*
`question`	Question	**Question 1.1.** *This is a test.*
`remark`	Remark	**Remark 1.1.** This is a test.
`solution`	Solution	**Solution 1.1.** This is a test.
`step`	Step	**Step 1.1.** This is a test.
`summary`	Summary	**Summary 1.1.** This is a test.
`theorem`	Theorem	**Theorem 1.1.** *This is a test.*

LaTeX provides `\newtheorem` to create new theorem environments. To add theorem-type environments to an article, use

```
\newtheorem{example}{Example}[section]
\let\Examplefont\upshape
\def\Exampleheadfont{\bfseries}

\begin{example}
We have $\# H^2 (M \supset N) < ...
\end{example}
```

For details see the LaTeX user manual.[1,2]

8.1. *Proofs*

The WSPC document styles also provide a predefined proof environment for proofs. The proof environment produces the heading 'Proof' with appropriate spacing and punctuation. It also appends a 'Q.E.D.' symbol, $\square$, at the end of a proof, e.g.,

```
\begin{proof}
This is just an example.
\end{proof}
```

to produce

Proof. This is just an example. $\square$

The proof environment takes an argument in curly braces, which allows you to substitute a different name for the standard 'Proof'. If you want to display, 'Proof of Lemma', then write e.g.

```
\begin{proof}[Proof of Lemma]
This is just an example.
\end{proof}
```

produces

Proof of Lemma. This is just an example. $\square$

9. Programs and Algorithms

Fragments of computer programs and descriptions of algorithms should be prepared as if they were normal text. Use the same fonts for keywords, variables, etc., as in the text; do not use small typeface sizes to make program fragments and algorithms fit within the margins set by the document style. An example with only the tabbing environment and one new definition:

```
\newcommand{\keyw}[1]{{\bf #1}}

\begin{tabbing}

\quad \=\quad \=\quad \kill
\keyw{for} each $x$ \keyw{do} \\
\> \keyw{if} extension$(p, x)$ \\
\> \> \keyw{then} $E:=E\cup\{x\}$\\
\keyw{return} $E$

\end{tabbing}
```

Output:

for each x **do**
  if extension(p, x)
    then $E := E \cup \{x\}$
return E

10. Mathematical Formulas

Inline: For in-line formulas use `\( ... \)` or `$ ... $`. Avoid built-up constructions, for example fractions and matrices, in in-line formulas. Fractions in inline can be typed with a solidus, e.g. `x+y/z=0`.

Display: For numbered display formulas, use the displaymath environment:

```
\begin{equation}
...
\label{aba:eqno}
\end{equation}
```

And for unnumbered display formulas, use `\[ ... \]`. For numbered displayed, one-line formulas always use the equation environment. Do not use `$$ ... $$`.

For example, the input for:

$$\mu(n,t) = \frac{\sum\limits^\infty_{i=1} 1(d_i < t, N(d_i) = n)}{\int\limits^t_{\sigma=0} 1(N(\sigma) = n)d\sigma}. \tag{1}$$

is:

```
\begin{equation}
\mu(n, t) =
\frac{\sum\limits^\infty_{i=1}1 (d_i < t, N(d_i) = n)}
{\int\limits^t_{\sigma=0}1 (N(\sigma)=n)d\sigma}.\label{aba:eq1}
\end{equation}
```

For displayed multi-line formulas, use the `eqnarray` environment. For example,

```
\begin{eqnarray}
\zeta\mapsto\hat{\zeta}&=&a\zeta+b\eta\label{aba:appeq2}\\
\eta\mapsto\hat{\eta}&=&c\zeta+d\eta\label{aba:appeq3}
\end{eqnarray}
```

produces:

$$\zeta \mapsto \hat{\zeta} = a\zeta + b\eta \tag{2}$$

$$\eta \mapsto \hat{\eta} = c\zeta + d\eta \tag{3}$$

Superscripts and subscripts that are words or abbreviations, as in σ_{low}, should be typed as roman letters, with `\(\sigma_{\mathrm{low}}\)` instead of σ_{low} done with `\(\sigma_{low}\)`.

For geometric functions, e.g. exp, sin, cos, tan, etc., please use the macros `\sin, \cos, \tan`. These macros give proper spacing in mathematical formulas.

It is also possible to use the $\mathcal{AMS}$-LaTeX package,[2] which can be obtained from the $\mathcal{AMS}$ and various TeX archives.

11. Floats

11.1. *Tables*

Put tables and figures in text using the table and figure environments, and position them near the first reference of the table or figure in the text. Please avoid long captions in figures and tables.

Input:

```
\begin{table}
\tbl{Comparison of acoustic for frequencies for piston-cylinder
problem.}
{\begin{tabular}{@{}cccc@{}}\toprule
Piston mass & Analytical frequency & TRIA6-$S_1$ model & ...\\
& (Rad/s) & (Rad/s) \\\colrule
1.0\hphantom{00}&\hphantom{0}281.0&\hphantom{0}280.81&0.07 \\
0.1\hphantom{00}&\hphantom{0}876.0&\hphantom{0}875.74&0.03 \\
0.01\hphantom{0}&2441.0&2441.0\hphantom{0}&0.0\hphantom{0} \\
0.001 & 4130.0 & 4129.3\hphantom{0}& 0.16\\\botrule
\end{tabular}}
\begin{tabnote}
$^{\text a}$ Sample table footnote.\\
\end{tabnote}\label{aba:tbl1}
\end{table}
```

Output:

Table 1. Comparison of acoustic for frequencies for piston-cylinder problem.

Piston mass	Analytical frequency (Rad/s)	TRIA6-S_1 model (Rad/s)	% Error[a]
1.0	281.0	280.81	0.07
0.1	876.0	875.74	0.03
0.01	2441.0	2441.0	0.0
0.001	4130.0	4129.3	0.16

Note: [a] Sample table footnote.

Very large figures and tables should be placed on a separate page by themselves. Landscape tables and figures can be typeset with the following environments:

- `sidewaystable` and
- `sidewaysfigure`.

Example:

```
\begin{sidewaystable}
\tbl{Positive values of ...}
```

Table 2. Positive values of X_0 by eliminating Q_0 from Eqs. (15) and (16) for different values of the parameters f_0, λ_0 and α_0 in various dimension.

f_0	λ_0	α_0	Positive roots (X_0)							
			4D	5D	6D	7D	8D	10D	12D	16D
−0.033	0.034	0.1	6.75507, 1.14476	4.32936, 1.16321	3.15991, 1.1879	2.44524, 1.22434	1.92883, 1.29065	0.669541, 0.415056	—	—
−0.1	0.333	0.2	3.15662, 1.24003	1.72737, 1.48602	—	—	—	—	—	—
−0.301	0.302	0.001	2.07773, 1.65625	—	—	—	—	—	—	—
−0.5	0.51	0.001	—	—	—	—	—	—	—	—
0.1	0.1	2	1.667, 0.806578	1.1946 0.858211	—	—	—	—	—	—
0.1	0.1	10	0.463679	0.465426	0.466489	0.466499	0.464947	0.45438	0.429651	0.35278
0.1	1	0.2	—	—	—	—	—	—	—	—
0.1	5	5	—	—	—	—	—	—	—	—
1	0.001	2	0.996033, 0.414324	0.968869, 0.41436	0.91379, 0.414412	0.848544, 0.414489	0.783787, 0.414605	0.669541, 0.415056	0.577489, 0.416214	—
	0.001	0.2	0.316014, 0.275327	0.309739, 0.275856	—	—	—	—	—	—
	0.1	5	0.089435	0.089441	0.089435	0.089409	0.08935	0.089061	0.088347	0.084352
	1	3	0.128192	0.128966	0.19718, 0.41436	0.169063, 0.414412	0.142103, 0.414489	—	—	—

```
{\begin{tabular}{@{}ccccccccccc@{}}
\toprule\\
$f_0$ &$\lambda_0$ &$\alpha_0$...
\end{tabular}}
\label{aba:tbl2}
\end{sidewaystable}
```

By using `\tbl` command in table environment, long captions will be justified to the table width while the short or single line captions are centered. `\tbl{table caption}{tabullar environment}`.

For most tables, the horizontal rules are obtained by:

toprule	one rule at the top
colrule	one rule separating column heads from data cells
botrule	one bottom rule
Hline	one thick rule at the top and bottom of the tables with multiple column heads

To avoid the rules sticking out at either end of the table, add `@{}` before the first and after the last descriptors, e.g. @llll@. Please avoid vertical rules in tables. But if you think the vertical rule is a must, you can use the standard LaTeX `tabular` environment.

Headings which span for more than one column should be set using `\multicolumn{#1}{#2}{#3}` where `#1` is the number of columns to be spanned, `#2` is the argument for the alignment of the column head which may be either c — for center alignment; l — for left alignment; or r — for right alignment, as desired by the users. Use c for column heads as this is the WS style and `#3` is the heading.

For the footnotes in the table environment the command is `{\begin{tabnote}<text>\end{tabnote}}`.

Tables should have a uniform style throughout the proceedings volume. It does not matter how you place the inner lines of the table, but we would prefer the border lines to be of the style as shown in our sample tables. For the inner lines of the table, it looks better if they are kept to a minimum.

11.2. *Figures*

The preferred graphics formats are TIF and Encapsulated PostScript (EPS) for any type of image. Our TeX installation requires EPS, but we can easily convert TIF to EPS. Many other formats, e.g. PICT (Macintosh), WMF (Windows) and various proprietary formats, are not suitable. Even if we can read such files, there is no guarantee that they will look the same on our systems as on yours.

A figure is obtained with the following commands:

```
\begin{figure}
\psfig{file=procs-fig1.eps,width=4.5in}
\caption{The bifurcating response curves of system
$\alpha=0.5, \beta=1.8; \delta=0.2, \gamma=0$: (a)
$\mu=-1.3$; and (b) $\mu=0.3$.}
\label{aba:fig1}
\end{figure}
```

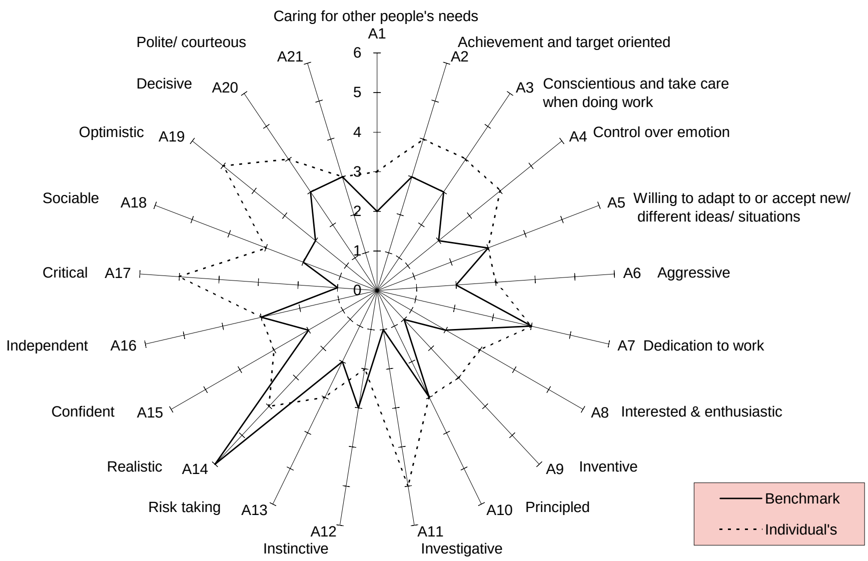

Fig. 1. The bifurcating response curves of system $\alpha = 0.5, \beta = 1.8; \delta = 0.2, \gamma = 0$: (a) $\mu = -1.3$; and (b) $\mu = 0.3$.

Adjust the scaling of the figure until it is correctly positioned, and remove the declarations of the lines and any anomalous spacing.

12. Cross-references

Use `\label` and `\ref` for cross-references to equations, figures, tables, sections, subsections, etc., instead of plain numbers. Every numbered part to which one wants to refer, should be labeled with the instruction `\label`. For example:

```
\begin{equation}
\mu(n, t) =
\frac{\sum\limits^\infty_{i=1}1 (d_i < t, N(d_i) = n)}
{\int\limits^t_{\sigma=0}1 (N(\sigma)=n)d\sigma}.\label{aba:eq1}
\end{equation}
```

With the instruction `\ref` one can refer to a numbered part that has been labeled:

```
..., see also Eq. (\ref{aba:eq1})
```

The `\label` instruction should be typed

- immediately after (or one line below), but not inside the argument of a number-generating instruction such as `\section` or `\caption`, e.g.: `\caption{ ... caption ... }\label{aba:fig1}`.
- roughly in the position where the number appears, in environments such as an equation,
- labels should be unique, e.g., equation 1 can be labeled as `\label{aba:eq1}`, where '`aba`' is author's initial and '`eq1`' the equation number.

Some useful shortcut commands.

Shortcut command	Equivalent TEX command	Output
In the middle of a sentence:		
`\eref{aba:eq1}`	Eq. (`\ref{aba:eq1}`)	Eq. (1)
`\sref{aba:sec1}`	Sec. `\ref{aba:sec1}`	Sec. 1
`\fref{aba:fig1}`	Fig. `\ref{aba:fig1}`	Fig. 1
`\tref{aba:tbl1}`	Table `\ref{aba:tbl1}`	Table 1
At the starting of a sentence:		
`\Eref{aba:eq1}`	Equation (`\ref{aba:eq1}`)	Equation (1)
`\Sref{aba:sec1}`	Section `\ref{aba:sec1}`	Section 1
`\Fref{aba:fig1}`	Figure `\ref{aba:fig1}`	Figure 1
`\Tref{aba:tbl1}`	Table `\ref{aba:tbl1}`	Table 1

13. Citations

We have used `\bibitem` to produce the bibliography. Citations in the text use the labels defined in the bibitem declaration, e.g., the first paper by Jarlskog[3] is cited using the command `\cite{jarl88}`. Bibitem labels should be unique.

For multiple citations, do not use `\cite{1}`, `\cite{2}`, but use `\cite{1,2}` instead.

When the reference forms part of the sentence, it should not be typed in superscripts, e.g.: "One can show from Ref. 3 that ...", "See Refs. 1 and 2 for more details." This is done using the LaTeX command: "`Ref.~\refcite{name}`".

14. Footnotes

Footnotes are denoted by a Roman letter superscript in the text. Footnotes can be used as

Input:

```
... total.\footnote{Sample footnote text.}
```

Output:
... in total.[a]

15. Acknowledgments and Appendices

Acknowledgments to funding bodies etc. may be placed in a separate section at the end of the text, before the Appendices. This should not be numbered, so use `\section*{Acknowledgments}`.

It is preferable to have no appendices in a short article, but if it is necessary, then simply use as

```
\appendix{About the Appendix}
Appendices should be...
\begin{equation}
\mu(n, t) = \frac{\sum^\infty_{i=1} 1(d_i < t, N(d_i) = n)}
{\int^t_{\sigma=0} 1(N(\sigma) = n)d\sigma}. \label{aba:app1}
\end{equation}
\subappendix{Appendix Sectional Units}
Sectional units are...
```

16. References

References are to be listed in the order cited in the text in Arabic numerals. BIBTeX users, please use our bibliography style file `ws-procs9x6.bst` for

[a]Sample footnote text.

references. Non BIBTEX users can list down their references in the following pattern.

```
\begin{thebibliography}{9}
\bibitem{jarl88} C. Jarlskog, in {\it CP Violation} (World
        Scientific, Singapore, 1988).

\bibitem{lamp94} L. Lamport, {\it \LaTeX, A Document
        Preparation System}, 2nd edition (Addison-Wesley,
        Reading, Massachusetts, 1994).

\bibitem{ams04} \AmS-\LaTeX{} Version 2 User's Guide (American
        Mathematical Society, Providence, 2004).

\bibitem{best03} B.~W. Bestbury, {\em J. Phys. A} {\bf 36},
        1947 (2003).
\end{thebibliography}
```

17. BIBTEXing

Sample output using `ws-procs9x6` bibliography style file:

BIBTEX Database entry type	Sample citation
article	... text.[4–6]
proceedings	... text.[7]
inproceedings	... text.[8]
book	... text.[3,9]
edition	... text.[10]
editor	... text.[11]
series	... text.[12]
tech report	See Refs. 13 and 14 for more details
unpublished	... text.[15]
phd thesis	... text.[16]
masters thesis	... text.[17]
incollection	... text.[18]
misc	... text.[19]

If you use the BIBTEX program to maintain your bibliography, you do not use the `thebibliography` environment. Instead, you should include

```
\bibliographystyle{ws-procs9x6}
\bibliography{ws-pro-sample}
```

where `ws-procs9x6` refers to a file `ws-procs9x6.bst`, which defines how your references will look.

The argument to `\bibliography` refers to the file `ws-pro-sample.bib`, which should contain your database in BIBTEX format. Only the entries referred to via `\cite` will be listed in the bibliography.

Appendix A. About the Appendix

Appendices should be used only when absolutely necessary. They should come before the References.

Table A1. Macros available for tables/figures.

Environment name	Purpose
`figure`	Figures
`sidewaysfigure`	Landscape figures
`table`	Tables
`sidewaystable`	Landscape tables
Horizantal rules	**Purpose**
`\toprule`	One rule at the top
`\colrule`	One rule separating column heads from data cells
`\botrule`	One bottom rule
`\Hline`	One thick rule at the top and bottom of the tables with multiple column heads

Number displayed equations occurring in the Appendix in this way, e.g. (A.1), (A.2), etc.

$$ds^2 = dt^2 - a_i^2 \tag{A.1}$$

Appendix A.1. *Appendix Sectional Units*

Where two or more appendices are used, number them alphabetically.

Sectional units are obtained with the LATEX commands:

- `\appendix`
- `\subappendix`.

Unnumbered appendix sections can be obtained using `\section*`.

Table A2. Macros available for use in text.

Macro name	Purpose
`\title{#1}`	Article title
`\author{#1}`	List of all authors
`\address{#1}`	Address of author
`\begin{abstract}...\end{abstract}`	Abstract
`\keywords{#1}`	Keywords
`\bodymatter`	Start body text
`\section{#1}`	Section heading
`\subsection{#1}`	Subsection heading
`\subsubsection{#1}`	Subsubsection heading
`\section*{#1}`	Unnumbered Section head
`\begin{itemlist}`	Start bulleted lists
`\end{itemlist}`	End bulleted lists
`\begin{arabiclist}`	Start arabic lists (1, 2, 3...)
`\end{arabiclist}`	End arabic lists
`\begin{romanlist}`	Start roman lists (i, ii, iii...)
`\end{romanlist}`	End roman lists
`\begin{Romanlist}`	Start roman lists (I, II, III...)
`\end{Romanlist}`	End roman lists
`\begin{alphlist}`	Start alpha lists (a, b, c...)
`\end{alphlist}`	End alpha lists
`\begin{Alphlist}`	Start alpha lists (A, B, C...)
`\end{Alphlist}`	End alpha lists
`\begin{proof}`	Start of Proof
`\end{proof}`	End of Proof
`\begin{theorem}`	Start of Theorem
`\end{theorem}`	End of Theorem (See Page 9 for list of other Math environments)
`\appendix{#1}`	Appendix Section heading
`\subappendix{#1}`	Appendix Subsection heading
`\begin{thebibliography}{#1}`	Start of numbered reference list
`\bibitem{#1}`	Reference item in numbered style
`\end{thebibliography}`	End of numbered reference list
`\bibliographystyle{#1}`	To include BIBTEX style file
`\bibliography{#1}`	To include BIBTEX database

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SAMPLE CHAPTER: ASSESSING THE EFFECTS OF THE UNCERTAINTY IN REHEATING ENERGY SCALE ON PRIMORDIAL SPECTRUM AND CMB*

BO FENG, XIAOBO GONG† and XIULIAN WANG‡

Institute of Physics, Chinese Academy of Science, P. O. Box 98-4,
Beijing 100039, P. R. China
‡*E-mail: wang@mail.ihep.ac.cn*

We search for regular tachyon kinks in an extended model, which includes the tachyon action recently proposed to describe the tachyon field. The extended model that we propose adds a new contribution to the tachyon action, which allows on to obtain stable tachyon kinks of regular profile, which may appropriately lead to the singular kink found by Sen sometime ago. Also, under specific conditions we may find periodic array of kink–antikink configurations.

1. Introduction

String theory is perhaps the most plausible candidate for a relativistic theory to describe the electromagnetic, weak, strong, and gravitational interactions altogether. It engenders a very rich structure which includes stable or BPS and unstable or non-BPS branes.[a]

In the last case, instabilities of non-BPS branes are marked by the presence of tachyon fields, whose dynamics are directly related to the process in which non-BPS branes decay into BPS branes — see e.g. Refs. 1–8.

These recent investigations on tachyons have suggested that the tachyon dynamics is described by the action

$$S = -\int d^{p+1}x V(T)\sqrt{1+\eta^{\mu\nu}\partial_\mu T\partial_\nu T}\,, \tag{1}$$

where $T = T(\mathbf{x}, t)$ is the tachyon field, real, and $x^\mu = (t, \mathbf{x})$ is the position vector. Also, the Minkowski metric has signature $(-, +, +, +, \ldots)$, and $V(T)$

*Supported by a FPPI grant.
†Also at Department of Physics, Peking University, Beijing 100871, P. R. China.
[a]The theory of electromagnetic.

is the potential, which is non-negative, obeys $V(T \to \pm\infty) \to 0$ and attains its global maximum at $T = 0$. We consider $0 \le V(T) \le 1$.

In the present work, in the above action we modify the Lagrange density to the new form

$$\tilde{\mathcal{L}} = -V(T)\left(\sqrt{1+\eta^{\mu\nu}\partial_\mu T \partial_\nu T} - \frac{1}{\sqrt{1+r^2F^2}}\right), \tag{2}$$

where r is a parameter, real and positive, and $F = F(T, \eta^{\mu\nu}\partial_\mu T \partial_\nu T)$. The real parameter r is introduced to control the way one goes beyond former investigations: for F that behaves appropriately, the limit $r \to \infty$ gives the former action (1) and leads to the problem investigated by Sen in Ref. 9; for $r \gg 1$ one may get to the recent investigation,[10] in which one modifies the action (1) by adding a term which depends on the derivative of the tachyon field.[b] In Ref. 10, the term included in the action is controlled by a very small parameter, and admits a perturbative investigation which very nicely leads to regular kink, and gives the singular kink of Ref. 9 in the appropriate limit.

2. Study of Some Special Orbits

In the loop space formalism for gauge theories the fields depend more on the paths rather than on spacetime points. The fundamental quantity that arises from this path-dependent approach is the non-integrable phase factor that represents a gauge field more adequately than the field strength does.

2.1. *The curves and angle*

The spin connection Γ_ϕ corresponds to closed curves with the time and the θ coordinate constants. The spin connection Γ_θ corresponds to closed curves with time and azimuthal angle constants.

2.1.1. *Single site events data*

The peak detection procedure is carried out within an energy interval that seems to not contain (according to the left-hand side) lines other than the one at $Q_{\beta\beta}$. This interval is broad enough (about ± 5 standard deviations of the Gaussian line) for a meaningful analysis.

[b]The action which modifies the derivative of the fields.

3. Generalities

We use the modified model to examine the energy corresponding to static configuration $T = T(\mathbf{x})$. We get

$$E = \int d^p x \, V(T) \left(\sqrt{1 + \partial_i T \partial^i T} - \frac{1}{\sqrt{1 + r^2 F^2}} \right) . \tag{3}$$

We investigate stability of static solutions with the Derrick–Hobart theorem[11] — see also Ref. 10. We change $T(\mathbf{x}) \to T^\lambda(\mathbf{x}) = T(\lambda \mathbf{x})$ to get

$$\frac{p + (p-1)\partial_i T \partial^i T}{\sqrt{1 + \partial_i T \partial^i T}} = \frac{p}{\sqrt{1 + r^2 F^2}} . \tag{4}$$

The case of a single spatial dimension is special. Here the above condition reduces to the simpler form $T'^2(x) = r^2 F^2(T)$, or better

$$T'(x) = \pm r F(T) ,$$

where the prime stands for derivative with respect to x. We note that the above Eq. (4) reproduces first-order differential equations that appear in the bosonic sector of supersymmetric field theory described a single chiral superfield; see, e.g. Ref. 15.

Let us now investigate the equation of motion that follows from the modified action. It can be written in the form

$$\frac{1}{\sqrt{1 + \partial_\mu T \partial^\mu T}} \left(\frac{dV}{dT} - V \partial_\mu \partial^\mu T + V \frac{\partial^\mu T \partial^\nu T \partial_\mu \partial_\nu T}{1 + \partial_\mu T \partial^\mu T} \right)$$

$$= \frac{1}{\sqrt{1 + r^2 F^2}} \left(\frac{dV}{dT} - \frac{r^2 F V}{1 + r^2 F^2} \frac{dF}{dT} \right) . \tag{5}$$

In the case $p = 1$, the static field obeys

$$\frac{1}{T'} \frac{d}{dx} \left(\frac{V}{\sqrt{1 + T'^2}} - \frac{V}{\sqrt{1 + r^2 F^2}} \right) = 0 . \tag{6}$$

This equation is solved by $T' \to \infty$, which are stable solutions of Eq. (4) in the limit $r \to \infty$, which leads to the case first investigated by Sen in Ref. 9, giving rise to the stable but singular tachyon kinks

$$T_S^{\pm}(x) = \begin{cases} \pm\infty & \text{for } x > 0 , \\ 0 & \text{for } x = 0 , \\ \mp\infty & \text{for } x < 0 . \end{cases} \tag{7}$$

There are other solutions, which obey

$$T'^2 = \frac{1}{\left(\frac{V_0}{V} + \frac{1}{\sqrt{1 + r^2 F^2}} \right)^2} - 1 , \tag{8}$$

where V_0 is a real constant, constrained to obey

$$0 \le \frac{1}{\sqrt{1 + r^2 F^2}} + \frac{V_0}{V} \le 1\,. \tag{9}$$

The case $V_0 = 0$ reproduces the former Eq. (4), leading to the conclusion that the solutions of the equation of motion are stable for $V_0 = 0$.

Theorem 3.1 in Sec. 3 will discuss the geometric property of the averaged Hall conductance $\overline{\sigma_{xy}(\phi)}$ as a geometric invariant for non-Abelian gauge fields on the gauge torus $\mathcal{T}_{\mathrm{g}}$.

Theorem 3.1. *Let $\mathcal{L}$ be a Banach space with a norm $||\cdot||_{\mathcal{L}}$ such that $\mathcal{L} \subset \mathcal{H}$ is a dense subset of a Hilbert space $\mathcal{H}$, and for any $f \in \mathcal{L}$.*

Since both $U^{(N)}(t,s)$ and $U_0^{(N)}(t,s)$ are bounded, one has the following Lemma 3.1:

Lemma 3.1. *In the strong sense, $U^{(N)}(t,s) \to U_0^{(N)}(t,s)$ as $F \to 0$, uniformly in t, s in any finite interval.*

4. Establish Equilibrium Mergers

Regular clusters may have gone some time since their last mergers. However, since the timescale to re-establish equilibrium after a major merger event is of the order of several Gyr, and since projection effects can hide evidence for mergers, the fraction of clusters that appear regular most likely provides an underestimate of the fraction that have recently undergone mergers.

Proposition 4.1. *There exist orthonormal vectors $\hat{\Phi}_{0,\mu}^{(N)}(\phi)$, $\mu = 1, 2, \ldots, q$ such that the sector of the (quasi) degenerate ground state is spanned by the vectors.*

In Proposition 4.2 the vector $E = 0$. It is easy to see that $b = 1$ is actually a minimum and that these integrals are bounded by a factor $\exp -cN$.

Proposition 4.2. *The $\hat{\Phi}_{0,\mu}^{(N)}(\phi)$, $\mu = 1, 2, \ldots, q$, and that all the vectors $E = 0 + \hat{\Phi}_{0,\mu}^{(N)}(\phi)$, $\mu = 1, 2, \ldots, q$, are infinitely differentiable with respect to the gauge parameters ϕ on the gauge torus $\mathcal{T}_{\mathrm{g}}$.*

Typical X-ray luminosities of clusters range between about 10^{44} and 10^{45} erg s^{-1}. The X-ray emission of the ICM is due to thermal bremsstrahlung for $T > 3 \cdot 10^7$ K while line cooling becomes very important at lower temperatures.

Corollary 4.1. *There exists a recursively closed, strongly polynomial-time approximable set* $S = R$ *is a nonrecurve real number between* 0 *and* 1.

We construct a simple fractal curve whose dimension is equal to 3/2. An important group of fractals is generated by dynamical systems.

Furthermore, since V_0 must obey the constraint (9), we can also have two other distinct possibilities: one for V_0 positive, representing the case of negative pressure, and the other for V_0 negative, representing the case of positive pressure. We shall show below that in the case of nonvanishing V_0, we must compactify the real line in order to have finite energy, and this will give rise to periodic tachyon kinks. Thus, in the modified model we shall find stable and regular tachyon kinks in an environment with vanishing pressure. And also, we shall find periodic kink–antikink array in another environment, with negative pressure. We notice from the above Eq. (9) that the limit $r \to \infty$, which leads to the standard tachyon action, gives rise to the case of negative pressure, and nothing more — see Refs. 16 and 17.

5. Specific Models

We investigate the case with $V_0 = 0$, which corresponds to vanishing pressure. This case gives rise to models that support stable tachyon kinks of regular profile. The energy depends on the tachyon potential, $V(T)$. Thus, we choose the tachyon potential such that $E_S = 1$. In this case the energy of the tachyon configurations is restricted to be in the interval $0 < E < 1$. We may choose $V_I(T) = \exp(-\pi T^2)$, $V_{IIa}(T) = 1/2\cosh^2(T)$, $V_{IIb}(T) = 1/\pi\cosh(T)$, and $V_{III}(T) = 1/\pi(1 + T^2)$ which identify type-I, type-II and type-III models, all leading to unit energy. We will study these models to have a better understanding of the role of the potential for the modified tachyon action that we propose in (2). Specific models involving the choices $F(T) = 1$ and $F(T) = 1/\cosh(T)$ will be investigated below.

5.1. *Type-I models*

We consider the case $F(T) = 1$, which implies that $T' = \pm r$, giving rise to the solutions $T_\pm(x) = \pm rx$, which lead to the singular kinks (7) in the limit $r \to \infty$. This case reproduces the solutions of Ref. 10. The energy corresponding to these solutions has the form

$$E_I(r) = \frac{r^2}{\sqrt{1+r^2}} \int_{-\infty}^{\infty} dx\, V(T)\,. \tag{10}$$

Thus, for $V(T) = \exp(-\pi T^2)$ and for $T_\pm = \pm rx$ we get

$$E_I(r) = \frac{r}{\sqrt{1+r^2}}\,. \tag{11}$$

We use this result to get $E(r=0) = 0$. This is interesting, since the limit $r \to 0$ leads to a constant tachyon configuration. Our model gives vanishing energy for trivial constant tachyon configurations at $r = 0$, and unit energy for the singular kink (7) at the limit $r \to \infty$. The stable kink solutions $T^\pm(x) = \pm rx$ are parametrized by r, and have energy as in Eq. (11), which is well-defined in the entire interval $0 \le r \le 1$. In Fig. 1 we plot $E_I(r)$ in the whole interval $r \in [0, \infty)$.

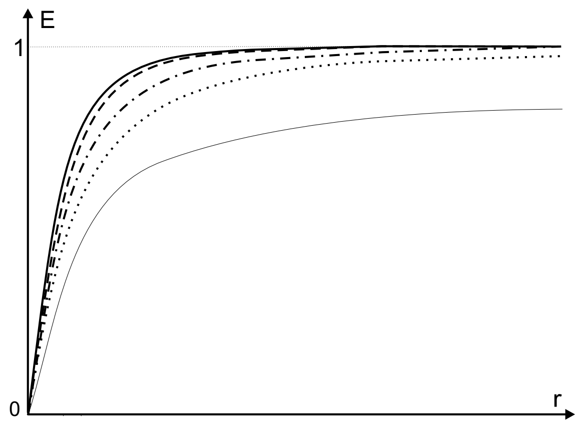

Fig. 1. The energy as a function of the real parameter r. The thick line corresponds to $F(T) = 1$, for all the models. The dashed, dash-dotted, and dotted lines correspond to $F(T) = 1/\cosh(T)$ for the type-I, type-IIa, and type-IIb models, respectively. The thin line corresponds to the type-III model, for $F(T) = 1/\cosh(T)$.

We also consider the case of $F(T) = 1/\cosh(T)$ to get

$$T' = \pm\frac{r}{\cosh(T)}\,. \tag{12}$$

This equation was already solved in Ref. 18. The solutions are $T(x) = \pm\,\mathrm{arcsinh}(r\,x)$, and we realize that the singular kink (7) is now very naturally recovered in the limit $r \to \infty$. The energy of the regular kinks can be written as

$$\tilde{E}_I(r) = r\int_{-\infty}^{\infty} dx\,\frac{e^{-\pi\,\mathrm{arcsinh}^2(x)}}{(1+x^2)\sqrt{1+\frac{r^2}{1+x^2}}} \tag{13}$$

and depends on the parameter r. It vanishes for $r = 0$, and converges to unit in the limit $r \to \infty$. In Fig. 1 we plot the energy density for $r \in [0, \infty)$. We note that $\tilde{E}_I(r)$ is very close to $E_I(r)$, indicating that the choice of $F(T)$ determine no qualitative behavior.

To make the difference between the unmovable bed and mobile layer become clearer, the brightness values are enlarged 20 times during our image analysis. Figure 2 shows typical visualized images for determining erosion depth under the experimental condition $T = 3$ s, $U_{\max} = 1.4$ m/s, $D_{50} = 0.3$ mm at the moment of maximum velocity and around flow reversal (zero velocity).

5.2. *Type-II models*

We first consider type-IIa models, and use $F(T) = 1$. The investigation is similar to the former case. The kink solutions and the energy give the very same results already obtained in the corresponding type-I model. Thus, we consider the next case: $F(T) = 1/\cosh(T)$. Here the energy changes to

$$\tilde{E}_{IIa}(r) = \frac{r}{2}\int_{-\infty}^{\infty} dx \frac{1}{(1+x^2)^2}\frac{1}{\sqrt{1+\frac{r^2}{1+x^2}}}\,. \tag{14}$$

It vanishes for $r = 0$, and converges to unit in the limit $r \to \infty$. In Fig. 1 we plot the energy $\tilde{E}_{IIa}(r)$ in the entire interval $r \in [0, \infty)$. We note that $\tilde{E}_{IIa}(r)$ is very close to $\tilde{E}_I(r)$, suggesting that the specific choice of the tachyonic potential seems to determine no qualitative behavior.

An imaging experiment with OH^+ in CRYRING led to discovery of a very small kinetic energy release when the electron energy was sufficient for the $O(^3P) + H(n = 2)$ dissociation limit (see Table 1) to become energetically allowed.

6. Ending Comments

In this work we have modified the tachyon action (1) by changing the square root contribution as in (2). We have found stable, finite energy tachyon kinks in the case of vanishing pressure in several different models. We have also found a network of kink–antikink configurations in the case of negative pressure. Although the scenario one finds in the case of negative pressure is similar to other extensions that appeared recently, the case of vanishing pressure is new, and it supports regular, stable and finite energy tachyon kinks which nicely lend themselves to Sen's singular solutions in the appropriate limit.

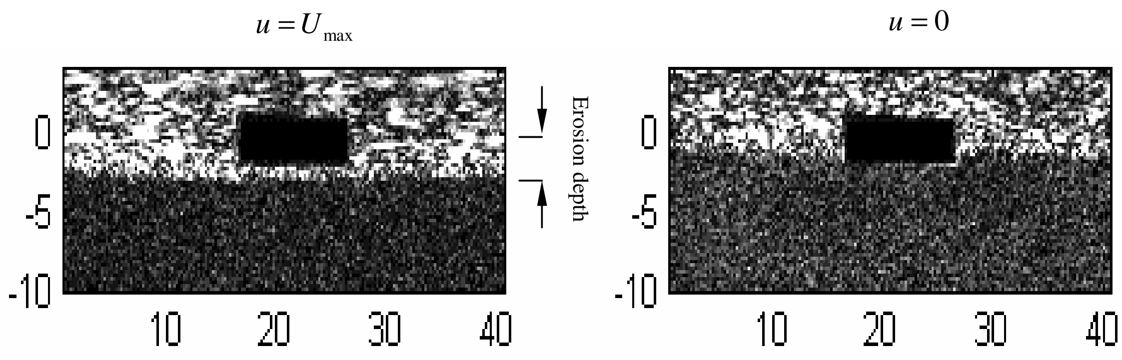

Fig. 2. Erosion depth at the moment of maximum velocity and around flow reversal (All dimensions are in mm). $T = 3$ s, $U_{\max} = 1.4$ m/s, $D_{50} = 0.3$ mm.

Table 1. Sample statistics for A-share premia for Shanghai companies that issued A- and B-shares before April 1994 (sample period: April 1, 1994–October 31, 1998).

Year	Taiwan Index	Dow Jones Index	Nikkei Index	South Korea's Kospi Index	London's FTSE Index	Hong Seng Index	Thailand's Set Index	Singapore's Strait Times
1988	5,119.11	2,168.57	30,159.00	907.20	1,455.30	2,687.44	386.73	1,038.62
1989	9,624.18	2,753.20	38,915.87	909.72	1,916.60	2,836.57	879.19	1,481.33
1990	4,530.16	2,633.70	23,848.71	696.11	1,673.40	3,243.30	612.86	1,154.48
1991	4,600.67	3,168.83	22,983.77	610.92	1,891.30	4,297.33	711.36	1,490.70
1992	3,377.06	3,301.11	16,924.95	678.44	2,185.20	5,512.39	893.42	1,524.40
1993	6,070.56	3,754.09	17,417.24	866.18	2,559.50	11,888.39	1,565.12	2,425.68
1994	7,124.66	3,834.44	19,723.06	1,027.37	3,065.50	8,191.04	1,360.09	2,239.56
1995	5,173.73	5,117.12	19,868.15	882.94	3,689.30	10,073.39	1,280.81	2,266.54
1996	6,933.94	6,448.27	19,361.35	651.22	4,118.50	13,451.45	831.57	2,216.79
1997	8,187.27	7,905.25	15,258.74	376.31	5,135.50	10,722.76	372.69	1,529.84
1998	6,418.43	9,181.43	13,842.17	562.46	5,882.60	10,048.58	355.81	1,392.73
1999	8,448.84	11,497.12	18,934.34	1,028.07	6,930.20	16,962.10	481.92	2,479.58
2000	5,544.18	10,971.14	14,539.60	514.48	6,438.40	14,895.34	271.84	1,976.54
1	9,744.89	10,940.53	19,539.70	943.88	6,268.50	15,532.34	477.57	2,230.28
2	9,435.94	10,128.31	19,959.52	828.38	6,232.60	17,169.44	374.32	2,120.50
3	9,854.95	10,921.92	20,337.32	860.94	6,540.20	17,406.54	400.32	2,132.59
4	8,777.35	10,733.91	17,973.70	725.39	6,327.40	15,519.30	390.40	2,164.11
5	8,939.52	10,522.33	16,332.45	731.88	6,359.30	14,713.86	323.29	1,795.13
6	8,265.09	10,447.89	17,411.05	821.22	6,312.70	16,155.78	325.69	2,037.97
7	8,114.92	10,521.98	15,727.49	705.97	6,365.30	16,840.98	284.67	2,051.21

Note: The state-budget funds as a dominant financial source of investment of SOEs, regardless of investment decisions being made by governments or enterprises. The retained profits and non-bank debts are also used by SOEs to finance their investment and operation.

Table 2. Number of spectra with a calculated confidence limit above a given value.

C.L.	90.0%	95.0%	99.0%	99.9%
Expected	100 ± 31	50 ± 7	10 ± 3	1 ± 1
Found	96	42	12	0

Table 2 presents the results: the first column contains the corresponding confidence limit c (precisely the parameter K_E defined earlier), the second column contains the *expected* number of spectra indicating the existence of a line with a confidence limit above the value c.

Acknowledgments

We thank F. A. Brito for discussions, and CAPES, CNPq, PROCAD and PRONEX for partial support.

Appendix A. Bach-flat Spaces

An interesting question is the characterization of those spaces (Appendix A) for which there is no obstruction. In $d = 2$ dimensions Eq. (A.1), this is equivalent to find Bach-flat spaces

$$ds^2 = dt^2 - a_i^2 \tag{A.1}$$

with Hubble paramers, $h_i - a_i^2$ and anisotropy parameters $m_i = h_i - h/3$

$$3d^2(pr)/dt^2 = 8pr_4^3c\,. \tag{A.2}$$

Appendix A.1. *The Bianchi identities*

There are two variables (Λ and r_c) in Eq. (A.4). r_c can be regarded as the total energy within the cosmological horizon, (Appendix A.1) on a phenomenological level,

$$\frac{dE}{dt} \sim \frac{\Delta E}{\Delta t} \sim G^{-1}\,. \tag{A.3}$$

When r_c is fixed, the entropy varies with Λ. That is to say, there are fluctuations in entropy due to different Λ.

Appendix A.1.1. *A fundamental principle*

There is a cosmological horizon r_c determined by $f(r_c, Q, \Lambda) = 0$

$$\begin{aligned}\kappa_c &= -\frac{1}{2} f'_r(r_c, Q, \Lambda) \\ &= r_c^{-1}\left(\frac{2\Lambda r_c^2}{3} - 1\right),\end{aligned} \tag{A.4}$$

where the second equality, (Appendix A.1.1) is derived from $f(r_c, Q, \Lambda) = 0$.

Appendix B. Higher Order Equations of Motion

In this Appendix B we present the equations of motion from order p^2 to order p^4

$$3(d-6)h^3 + (3h - 3h^2 + h_k)\,. \tag{B.1}$$

The studies to date have considered bubbles in idealized cluster atmospheres, clusters are known to undergo mergers which dramatically affect their structure.

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