

# The `apxproof` package

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## Abstract

This package facilitates the writing of scientific article with proofs deferred to the appendix.

## 1 Usage

TODO

## 2 Implementation

We now describe the entire code of the package, in literate programming fashion.

### 2.1 Dependencies

We first load a few package dependencies:

- `bibunits` to add a second bibliography for the appendix material.

```
1 \RequirePackage{bibunits}
```

- `environ` to easily define the repeated theorem environments.

```
2 \RequirePackage{environ}
```

- `etoolbox` to define simple toggles.

```
3 \RequirePackage{etoolbox}
```

- `fancyvrb` for the bulk of the work of exporting appendix material in an auxiliary file.

```
4 \RequirePackage{fancyvrb}
```

- `ifthen` for easier comparison of character strings.

```
5 \RequirePackage{ifthen}
```

- `kvoptions` to manage options passed to the package.

```
6 \RequirePackage{kvoptions}
```

- `amsthm` for its `\newtheorem` macro. Some document classes (e.g., `lipics`) preload the `amsthm`: this is fine, `\RequirePackage{amsthm}` will simply have no effect. On the other hand, some other document classes (e.g., `llncs` or `sig-alternate`) define a `proof` environment that conflicts with `amsthm`, so we have to undefine this environment before loading `amsthm`.

```
7 \ifpackageloaded{amsthm}{
8   }{
9     \let\proof\undefined
10    \let\endproof\undefined
11  }
12 \RequirePackage{amsthm}
```

## 2.2 Option Processing

Many names throughout the package use an atrobace (`@`) to avoid name conflict with user-defined names. To simplify the compilation of the documentation, we simply make it a regular character in all the rest.

```
13 \makeatletter
```

We setup the processing of options using `keyval` facilities; the only declared options is named `append`, with a default value of `append`:

```
14 \SetupKeyvalOptions{
15   family=AXP,
16   prefix=AXP@
17 }
18 \DeclareStringOption[append]{append}
19 \ProcessLocalKeyvalOptions*
```

We check that the value of the `append` option is valid, and add a message to the compilation log.

```
20 \ifthenelse{\equal{\AXP@append}{append}}{
21   \message{apxproof: Appendix material appended to the document}
22 }{\ifthenelse{\equal{\AXP@append}{strip}}{
23   \message{apxproof: Appendix material stripped}
24 }{\ifthenelse{\equal{\AXP@append}{inline}}{
25   \message{apxproof: Appendix material inlined within the document}
26 }{
27   \errmessage{Error: unsupported option appendix=\AXP@append for
28   package apxproof}
29 }}}}
```

## 2.3 Macros Common to All Compilation Modes

`\newtheoremrep` We define the high-level `\newtheoremrep` to have the same syntax as `amsthm`'s `\newtheorem`. For this purpose, we need a little trick to deal with the second

optional argument, which is what `\@oparg` is used for. `\axp@newtheoremrep` is defined differently depending on the compilation mode

```
30 \newcommand\newtheoremrep[1]{%
31   \@oparg{\axp@newtheoremrep{#1}}[]%
32 }
```

`proofsketch` Simple `proofsketch` environment.

```
33 \newenvironment{proofsketch}
34   {\vskip3pt\noindent\emph{Proof sketch.} }
35   {\hfill\qed\vskip3pt}
```

`\thmhead` We redefine AMS- $\text{\LaTeX}$ 's `\thmhead` to use a format where the repeated version of a theorem, using a theorem note, can look exactly like the original version of the theorem and its theorem counter.

```
36 \def\thmhead#1#2#3{%
37   \thmname{#1}\thmnumber{\@ifnotempty{#1}{ }\@upn{#2}}%
38   \thmnote{ #3}}
```

## 2.4 Inline Compilation Mode

```
39 \ifthenelse{\equal{\AXP@appendix}{inline}}{
```

`axp@newtheoremrep` In the inline mode, `axp@newtheoremrep` undefines the existing theorem environment if it has already been defined (e.g., by the document class), invokes `\newtheorem` and creates a repeated theorem environment that behaves exactly as the regular theorem environment.

```
40   \def\axp@newtheoremrep#1[#2]#3{%
41     \expandafter\let\csname #1\endcsname\undefined
42     \expandafter\let\csname c@#1\endcsname\undefined
43     \newtheorem{#1}[#2]{#3}%
44     \NewEnviron{#1rep}[1][]{%
45       \begin{#1}[##1]\BODY\end{#1}%
46     }
47   }
```

`inlineproof` In the inline mode, these environments behave like the regular `proof` environment.

```
nestedproof 48 \let\inlineproof\proof
appendixproof 49 \let\endinlineproof\endproof
50 \let\nestedproof\proof
51 \let\endnestedproof\endproof
52 \let\appendixproof\proof
53 \let\endappendixproof\endproof
```

`toappendix` In the inline mode, this environment and these macros are no-op.

```
\noproofinappendix 54 \newenvironment{toappendix}{}{}
\nosectionappendix 55 \let\noproofinappendix\relax
56 \let\nosectionappendix\relax
```

Finally, some class-specific behavior so that theorems created by `\newtheoremrep` appear with the correct style. For now, only the styling for ACM document class (e.g., `sig-alternate`) needs to be adapted.

```

57 \ifdefined\acmtitlebox
58   \newtheoremstyle{mystyle}
59     {3pt}
60     {3pt}
61     {\itshape}
62     {}
63     {\scshape}
64     {.}
65     {.5em}
66     {}
67   \theoremstyle{mystyle}
68 \fi
69 }
```

## 2.5 Append or Strip Compilation Modes

```
70 {
```

We now deal with the case where `apxproof` really does something useful: either append the appendix material to the document, or strip it entirely.

### 2.5.1 Auxiliary File for the Appendix

```

71 \newwrite\axp@proofsfile
72 \immediate\openout\axp@proofsfile=\jobname.axp
73 \immediate\write\axp@proofsfile{%
74   \noexpand\makeatletter
75   \noexpand\let\noexpand\proof\noexpand\axpold@proof
76   \noexpand\let\noexpand\endproof\noexpand\endaxpold@proof
77   \noexpand\let\noexpand\section\noexpand\axpold@section
78 }
79 \def\FVB@VerbatimOut{%
80   \@bsphack
81   \begingroup
82     \FV@UseKeyValues
83     \FV@DefineWhiteSpace
84     \def\FV@Space{\space}%
85     \FV@DefineTabOut
86     \def\FV@ProcessLine{\immediate\write\axp@proofsfile}%
87     \let\FV@FontScanPrep\relax
88     \let\@noligs\relax
89     \FV@Scan}
90 \def\FVE@VerbatimOut{\endgroup\@esphack}
91 \newenvironment{toappendix}
92   {\axp@writesection\VerbatimOut}
93   {\endVerbatimOut}
```

### 2.5.2 Definition of New Theorems

```

94 \newtoggle{axp@seenreptheorem}
95 \newcounter{axp@rpcounter}
96 \newcounter{axp@seccounter}
97
98 \def\axp@newtheoremrep#1[#2]#3{%
99   \newtheorem*{axp@#1rp}{#3}%
100   \expandafter\let\csname #1\endcsname\undefined
101   \expandafter\let\csname c@#1\endcsname\undefined
102   \newtheorem{#1}[#2]{#3}%
103   \NewEnviron{#1rep}[1][]{%
104     \addtocounter{axp@rpcounter}{1}%
105     \begin{#1}[##1]\label{axp@r\roman{axp@rpcounter}}\BODY\end{#1}%
106     \global\toggletrue{axp@seenreptheorem}%
107     \global\expandafter\let\csname rplet\roman{axp@rpcounter}\endcsname\BODY%
108     \axp@writesection%
109     \immediate\write\axp@proofsfile{%
110       \noexpand\begin{axp@#1rp}[\noexpand\ref{axp@r\roman{axp@rpcounter}}]\@ifnotempty{##1}{\%
111       \noexpand\let\noexpand\label\noexpand\@gobble%
112       \expandafter\noexpand\csname rplet\roman{axp@rpcounter}\endcsname\noexpand\end{axp@#1rp}
113     }
114   }
115 }

```

### 2.5.3 Proof Environments

```

116 \let\axpold@proof\proof
117 \let\endaxpold@proof\endproof
118
119 \def\noproofinappendix{%
120   \global\togglefalse{axp@seenreptheorem}%
121 }
122
123 \newenvironment{appendixproof}
124   {%
125     \axp@writesection
126     \immediate\write\axp@proofsfile{%
127       \noexpand\begin{axpold@proof}%
128     }%
129     \VerbatimOut
130   }
131   {%
132     \endVerbatimOut
133     \immediate\write\axp@proofsfile{%
134       \noexpand\end{axpold@proof}%
135     }%
136     \noproofinappendix
137   }
138
139 \renewenvironment{proof}
140   {%
141     \iftoggle{axp@seenreptheorem}{%

```

```

142     \appendixproof
143   }{%
144     \axpold@proof
145   }%
146 }
147 {%
148   \iftoggle{axp@seenreptheorem}{%
149     \endappendixproof
150   }{%
151     \endaxpold@proof
152   }%
153 }
154
155 \let\inlineproof\axpold@proof
156 \let\endinlineproof\endaxpold@proof
157
158 \let\nestedproof\axpold@proof
159 \let\endnestedproof\endaxpold@proof

```

#### 2.5.4 Section Management

```

160 \def\axp@sectitle{}
161
162 \let\axpold@section\section
163 \def\section{\@ifstar\@section\@@section}
164 \def\@section#1{%
165   \global\edef\axp@sectitle{#1}%
166   \axpold@section*{#1}%
167   \addtocounter{axp@seccounter}{1}%
168   \label{axp@s\roman{axp@seccounter}}}%
169 }
170 \def\@@section#1{%
171   \global\edef\axp@sectitle{#1}%
172   \axpold@section{#1}%
173   \addtocounter{axp@seccounter}{1}%
174   \label{axp@s\roman{axp@seccounter}}}%
175 }
176
177 \newcommand{\nosectionappendix}{
178   \global\def\axp@sectitle{}%
179 }
180
181 \newcommand\axp@writesection{%
182   \ifx\axp@sectitle\empty
183   \else
184     \immediate\write\axp@proofsfile{\noexpand\def\noexpand\tmp{\noexpand\ref{axp@s\roman{axp@seccounter}}}%
185     (\axp@sectitle)}}%
186   \nosectionappendix
187   \fi
188 }

```

### 2.5.5 Append Compilation Mode

```

189 \let\axpold@bibliography\ bibliography
190 \renewcommand\ bibliography[1]{%
191   \defaultbibliography{#1}%
192   \axpold@bibliography{#1}%
193 }
194 \newcommand\appendixrefname{References for the Appendix}
195 \newcommand\appendixbibliographystyle{\alpha}
196 \newcommand\appendixbibliographyprelim{}
197
198 \ifthenelse{\equal{\AXP@appendix}{append}}{
199   \AtEndDocument{%
200     \clearpage\onecolumn\appendix
201     \appendixbibliographyprelim
202     \begin{bibunit}[\appendixbibliographystyle]%
203       \immediate\closeout\axp@proofsfile\input{\jobname.axp}%
204       \renewcommand\refname{\appendixrefname}%
205       \putbib
206       \end{bibunit}%
207     }
208   }{}

```

### 2.5.6 Class-Specific Behavior

We conclude with some class-specific behavior.

\@getclass	We first use a little trick to store the current document class in macro \@currentclass,
\@getclass	from <a href="http://tex.stackexchange.com/a/43541">http://tex.stackexchange.com/a/43541</a> .
\@currentclass	209 \def\@getclass#1.cls#2\relax{\def\@currentclass{#1}}
	210 \def\@getclass{\expandafter\@getclass\@filelist\relax}
	211 \@getclass

### ACM Document Classes

```

212 \ifdefined\acmttitlebox

```

\thebibliography	The section title of the bibliography is in uppercase in these document classes. In
\refname	addition, the \thebibliography macro hard-codes twice the section title, so we
\appendixrefname	un-hardcode it so that it can be modified in the appendix.

```

213 \patchcmd{\thebibliography}{References}{\protect\refname}{}{}
214 \patchcmd{\thebibliography}{References}{\protect\refname}{}{}
215 \newcommand\refname{REFERENCES}
216 \renewcommand\appendixrefname{REFERENCES FOR THE APPENDIX}

```

\section	These document classes redefine \section in a weird way, adding the possibility
\@section	of an optional argument. We redefine this in a sane way.

```

217 \def\section{\ifstar\@section{\dblarg{\@section}}}
218 \def\@section#1#2{%
219   \global\edef\axp@sectitle{#2}%
220   \axpold@section{#2}%

```

```

221     \addtocounter{axp@seccounter}{1}%
222     \label{axp@s\roman{axp@seccounter}}}%
223   }

224   \fi

```

## lipcs

```

225   \ifthenelse{\equal{\@currentclass}{lipics}}{

```

`\appendixbibliographyprelim` The default bibliography in the lipics document class formatting is not compatible with the alpha bibliography style. We fix this here.

```

226     \renewcommand{\appendixbibliographyprelim}{%
227       \global\let\oldbiblabel\@biblabel
228       \def\@biblabel{\hspace*{-2em}\small\oldbiblabel}%
229     }

230   }
231 }

```

## Change History

v1.0.0-dev

General: Initial version . . . . . 1

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