The fusioncategories package*

Jacob C. Bridgeman
jcbridgeman.github.io
jcbridgeman1@gmail.com

31st July 2024

Abstract

The fusioncategories package is a package for typesetting fusion category data, including F- and R-symbols.
This document provides a brief overview of the pacakge and its features.

Contents

*This document corresponds to fusioncategories v0.1.3, dated 2024-07-31.

The **fusioncategories** package

1 Options

`delimiter` `delimiter = {⟨delimiter⟩}`
`default: ,`

Sets the delimiter for the subscripts, superscripts, left indices, and right indices.

`style` `style = ⟨style⟩ - {graphical,traditional,compact}`

Sets the style for symbol indices. This option sets the default global style, which can be overridden for individual symbols.
The default style is `graphical`, which places the indices in a style mimiciking their location on a string diagram. The `traditional` style places the indices in a more traditional style, and the `compact` style places the indices with left indices at the bottom and right indices at the top.

`graphical` - $\begin{smallmatrix}\beta\\ e\\ \alpha\end{smallmatrix}\left[F_{abc}^{\ d}\right]\begin{smallmatrix}\nu\\ f\\ \mu\end{smallmatrix}$

`traditional` - $\left[F_{abc}^{\ d}\right]_{(\alpha e\beta)(\mu f\nu)}$

`compact` - $\left[F_{abc}^{\ d}\right]^{\mu f\nu}_{\alpha e\beta}$

2 Commands

\NewSymbol
\RenewSymbol
\ProvideSymbol
\DeclareSymbol

`\NewSymbol[`⟨*text={⟨text⟩},style={⟨style⟩}*⟩`]{`⟨*Symbol name*⟩`}{`⟨*subscripts?*⟩`}{`⟨*superscripts?*⟩`}{`⟨*left indices?*⟩`}{`⟨*right indices?*⟩`}`

Creates a new symbol (and matrix if ⟨*left indices?*⟩ = true or ⟨*right indices?*⟩ = true) command with the specified argument types.
For example:

`\NewSymbol{N}{true}{true}{}{}` creates the command:
`\NSymbol`, which can be used as follows:
`\NSymbol{a,b}{c}` produces: N^{c}_{ab}.

`\NewSymbol[text=\tilde{X}]{tX}{true}{}{}{true}` creates the command:
`\tXSymbol`, which can be used as follows:
`\tXSymbol{a,b}{\mu}` produces: $\left[\tilde{X}_{ab}\right]_{\mu}$.
In addition, the command `\tXMatrix`, which can be used as follows:
`\tXMatrix{a,b}` produces: $\tilde{X}_{ab}$.

`\NewSymbol{\Gamma}{true}{}{}{}` creates the command:
`\GammaSymbol`, which can be used as follows:
`\GammaSymbol{a,b}` produces: Γ_{ab}.

`\NewSymbol[text=F,style=traditional]{tradF}{1}{1}{1}{1}` creates the command:
`\tradFSymbol`, which can be used as follows:
`\tradFSymbol{a,b,c}{d}{\mu}{\nu}` produces: $\left[F^{\ d}_{abc}\right]_{\mu\nu}$.

Arguments that are wanted should marked with `1` or `true`, and arguments that are not wanted must be left blank or marked with `false`.

All commands created with `\NewSymbol` also accept an optional star argument to place an overline over the symbol.

If the symbol has left or right indices, the command will also create a matrix command with the same name as the symbol command.

`\NewSymbol` will only create a new symbol command if the command does not already exist, otherwise it will throw an error.

`\RenewSymbol` will overwrite an existing symbol command with the same name. If the command does not exist, it will throw an error.

`\ProvideSymbol` will create a new symbol command if the command does not already exist, otherwise it will do nothing.

`\DeclareSymbol` will create a new symbol regardless of whether the command already exists. If the command already exists, it will overwrite the existing command without warning.

Any text in the `text` option will be used as the symbol text in the output.

The `style` option can be used to set the style of the symbol. This option will override the global style option for the symbol. The same styles are available as for the global style option.

`\NSymbol` `\NSymbol⟨*⟩{⟨subscripts⟩}{⟨superscripts⟩}`

Produces a symbol with the specified subscripts and superscripts.

`\NSymbol{a,b}{c}` produces: N_{ab}^{c}.

`\XSymbol` `\XSymbol⟨*⟩{⟨subscripts⟩}{⟨superscripts⟩}{⟨right indices⟩}`
`\XMatrix` `\XMatrix⟨*⟩{⟨subscripts⟩}{⟨superscripts⟩}`

Produces a symbol with the specified subscripts, superscripts, and right indices.

`\XSymbol{a,b}{c}{\alpha}` produces: $\left[X_{ab}^{c}\right]_{\alpha}$.

`\XMatrix{a,b}{c}` produces: X_{ab}^{c}.

`\FSymbol` `\FSymbol⟨*⟩{⟨subscripts⟩}{⟨superscripts⟩}{⟨left indices⟩}{⟨right indices⟩}`
`\FMatrix` `\FMatrix⟨*⟩{⟨subscripts⟩}{⟨superscripts⟩}`

Produces a symbol with the specified subscripts, superscripts, left indices, and right indices.

`\FSymbol{a,b,c}{d}{\alpha,e,\beta}{\mu,f,\nu}` produces: ${}^{\beta}_{e}{}^{\nu}_{f}\left[F_{abc}^{d}\right]^{\nu}_{\mu}$.

`\FSymbol*{a,b,c}{d}{\alpha,e,\beta}{\mu,f,\nu}` produces: ${}^{\beta}_{e}{}^{\nu}_{f}\left[\overline{F_{abc}^{d}}\right]^{\nu}_{\mu}$.

`\FMatrix{a,b,c}{d}` produces: F_{abc}^{d}.

`\FMatrix*{a,b,c}{d}` produces: $\overline{F_{abc}^{d}}$.

`\RSymbol` `\RSymbol⟨*⟩{⟨subscripts⟩}{⟨superscripts⟩}{⟨left indices⟩}{⟨right indices⟩}`
`\RMatrix` `\RMatrix⟨*⟩{⟨subscripts⟩}{⟨superscripts⟩}`

Produces a symbol with the specified subscripts, superscripts, left indices, and right indices.

`\RSymbol{a,b}{c}{\alpha}{\beta}` produces: ${}_{\alpha}\left[R_{ab}^{c}\right]_{\beta}$.

`\RMatrix{a,b}{c}` produces: R_{ab}^{c}.

`\PentagonEquation` `\PentagonEquation⟨*⟩[⟨a⟩][⟨b⟩][⟨c⟩][⟨α⟩][⟨β⟩][⟨γ⟩]`

Typesets the pentagon equation for a fusion category. If the optional $*$ argument is used, the equation is typeset for the multiplicity free case.

The optional arguments a, b, c, α, β, and γ are used to specify the symbols used in the equation. If these arguments are left blank, the default symbols are used.

`\PentagonEquation*` produces:

$$ {}_{a_5}\left[F_{a_0a_1c_0}^{a_4}\right]_{c_1}\,{}_{a_6}\left[F_{a_5a_2a_3}^{a_4}\right]_{c_0} = \sum_{b_0}\,{}_{a_5}\left[F_{a_0a_1a_2}^{a_6}\right]_{b_0}\,{}_{a_6}\left[F_{a_0b_0a_3}^{a_4}\right]_{c_1}\,{}_{b_0}\left[F_{a_1a_2a_3}^{c_1}\right]_{c_0}. $$

Index

The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

Change History