tmat.sty – tensor matrix-representations

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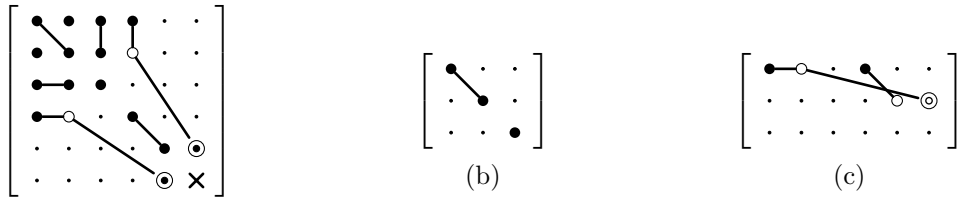
This package helps visualizing the structure of matrices representing tensors. It requires the tikz package. The package provides an environment *tmat* which takes two parameters, the dimensions of the matrix. The environment requires math mode. Inside the environment a sequence of commands can be given. The available commands are listed in table 1. They either define a symbol to appear at the location specified by the parameter of the command or a link between two elements. If no symbol is defined for an element, the default, a small dot, is shown. This would define a zero value in the usual use of the notation.

Table 1: Elements available, notation and usual interpretation

Symbol	Command	Interpretation
·		a component that is zero
•	`\tmatpv{M}{N}`	element (M,N) that is nonzero
○	`\tmatpn{M}{N}`	element (M,N) has sign opposite to the one it is connected to
⊙	`\tmatpdv{M}{N}`	element (M,N) has twice the value of the solid-circle component it is connected to
◎	`\tmatpdn{M}{N}`	element (M,N) has minus twice the value of the solid-circle component it is connected to
×	`\tmatpx{M}{N}`	element (M,N) is given by other elements
╲	`\tmatlink{M N}{P Q}`	connection between elements (M,N) and (P,Q) with related values

Examples of typical use are provided by the matrices given in figure 1.



(a) (b) (c)

Figure 1: Matrices for a material of with class-32 symmetry. (a) S^E, S^D. (b) κ^ϵ, κ^σ, β^ϵ, β^σ. (c) d.

As an example of use, the code producing the matrix in figure 1a is:

```
\begin{tmat}{6}{6}
    \tmatpv{1}{1}
    \tmatpv{1}{2}
    \tmatpv{1}{3}
    \tmatpv{1}{4}
    \tmatpv{2}{1}
    \tmatpv{2}{2}
    \tmatpv{2}{3}
    \tmatpn{2}{4}
    \tmatpv{3}{1}
    \tmatpv{3}{2}
    \tmatpv{3}{3}
    \tmatpv{4}{1}
    \tmatpn{4}{2}
    \tmatpv{4}{4}
    \tmatpv{5}{5}
    \tmatpx{6}{6}
    \tmatpdv{6}{5}
    \tmatpdv{5}{6}
    \tmatlink{1 1}{2 2}
    \tmatlink{1 3}{2 3}
    \tmatlink{1 4}{2 4}
    \tmatlink{2 4}{5 6}
    \tmatlink{3 1}{3 2}
    \tmatlink{4 1}{4 2}
    \tmatlink{4 2}{6 5}
    \tmatlink{4 4}{5 5}
  \end{tmat}
```