

MATERIALS

In order to work with different materials and to specify their properties global and local material database are defined. Global material database is stored as separate file (with an extension *.mdb) and can be modified via menu *Databases* → *Materials*. Materials which are defined in the global database can be used in different simulations. The local database is directly related to the specific scene and can be accessed via menu *Scene* → *Materials Editor*. Local database is directly stored in the dem file *.mdem. To have an access to the materials from global database they should be firstly added from global to the local database. Afterwards, material properties can be directly modified in the local database.

Graphical user interface of databases consists of three main tabs:

- *Compounds*: add/delete specific compounds and modify their properties;
- *Interactions*: modify interactions properties between existing compounds;
- *Mixtures*: add/delete/modify mixtures. Mixture is a definition of particle distribution according to size and compounds. The mixtures can be used in the Package Generator.

Following properties of the compounds are used during simulation (all parameters which are not important for your scene shouldn't be defined):

- *Author* – you can specify here your name;
- *Color* – by double-click on the color box material-specific color can be selected. This color will be used when “*Coloring by materials*” will be selected in the 3D view;
- *Density* [kg/m^3] – used to calculate mass of particles;
- *Dynamic viscosity* [$\text{Pa}\cdot\text{s}$] – important for solids bonds only (used in several models, see further documentation);
- *Young modulus* [Pa] – used for particles, solid bonds and walls;
- *Normal strength* [Pa] – used to predict breakage of solids bonds only;
- *Tangential strength* [Pa] – used to predict breakage of solids bonds only;
- *Poisson ratio* (-) – used for particles, solid bonds and walls;
- *Surface energy* [J/m^2] – used in particle-particle sintering model;
- *Atomic volume* [m^3/mol] – used in particle-particle sintering model;
- *Surface tension* [N/m] – used in particle-particle sintering model;
- *Time-related thermal expansion coefficient* [$\text{K}^{-1}\text{s}^{-1}$] – used in solid bond model for thermal expansion.
- *Yield strength* [Pa] – used in models considering plasticity.

In the second tab interactions between objects of different compounds are specified. To see which properties are important for your contact models, see accorded model documentation.

Each mixture can consist of several fractions. For each fraction the specific name, compound and diameter can be defined. Moreover, the number-related fraction of these particles in the total mixture must be specified. **Note: total fraction must be equal to 1.** For automatic normalization use the button Normalize.