



# UMAT



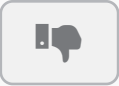
**Warning:** The use of this subroutine generally requires considerable expertise. You are cautioned that the implementation of any realistic constitutive model requires extensive development and testing. Initial testing on a single-element model with prescribed traction loading is strongly recommended.

User subroutine [UMAT](#):

- can be used to define the mechanical constitutive behavior of a material;
- will be called at all material calculation points of elements for which the material definition includes a user-defined material behavior;
- can be used with any procedure that includes mechanical behavior;
- can use solution-dependent state variables;
- must update the stresses and solution-dependent state variables to their values at the end of the increment for which it is called;
- must provide the material Jacobian matrix,  $\mathbf{C} = (1/J) \partial \Delta (J\boldsymbol{\sigma}) / \partial \Delta \boldsymbol{\epsilon}$ , for the mechanical constitutive model;
- can be used in conjunction with user subroutine [USDFLD](#) to redefine any field variables before they are passed in; and
- is described further in [User-Defined Mechanical Material Behavior](#).

This page discusses:

- [Storage of Stress and Strain Components](#)
- [Defining Local Orientations](#)
- [Stability](#)
- [Convergence Rate](#)
- [Viscoelastic Behavior in Frequency Domain](#)
- [Special Considerations for Various Element Types](#)



Is this page useful?

## See Also

### In Other Guides

[User-Defined Mechanical Material Behavior](#)

[User-Defined Thermal Material Behavior](#)

[\\*USER MATERIAL](#)

[SDVINI](#)

[UMAT and UHYPER](#)