Acceleration load in arbitrary direction

Tutorial

Name:	Acceleration load in arbitrary direction
Description:	Guidelines for acceleration-load application in an arbitrary direction. Applicable to static, modal, and buckling load cases.
Program:	SAP2000
Version:	14.2.3
Model ID:	na

The orientation of acceleration load may be specified for certain types of load cases, including response-spectrum and time-history, as shown for SAP2000 in Figure 1:

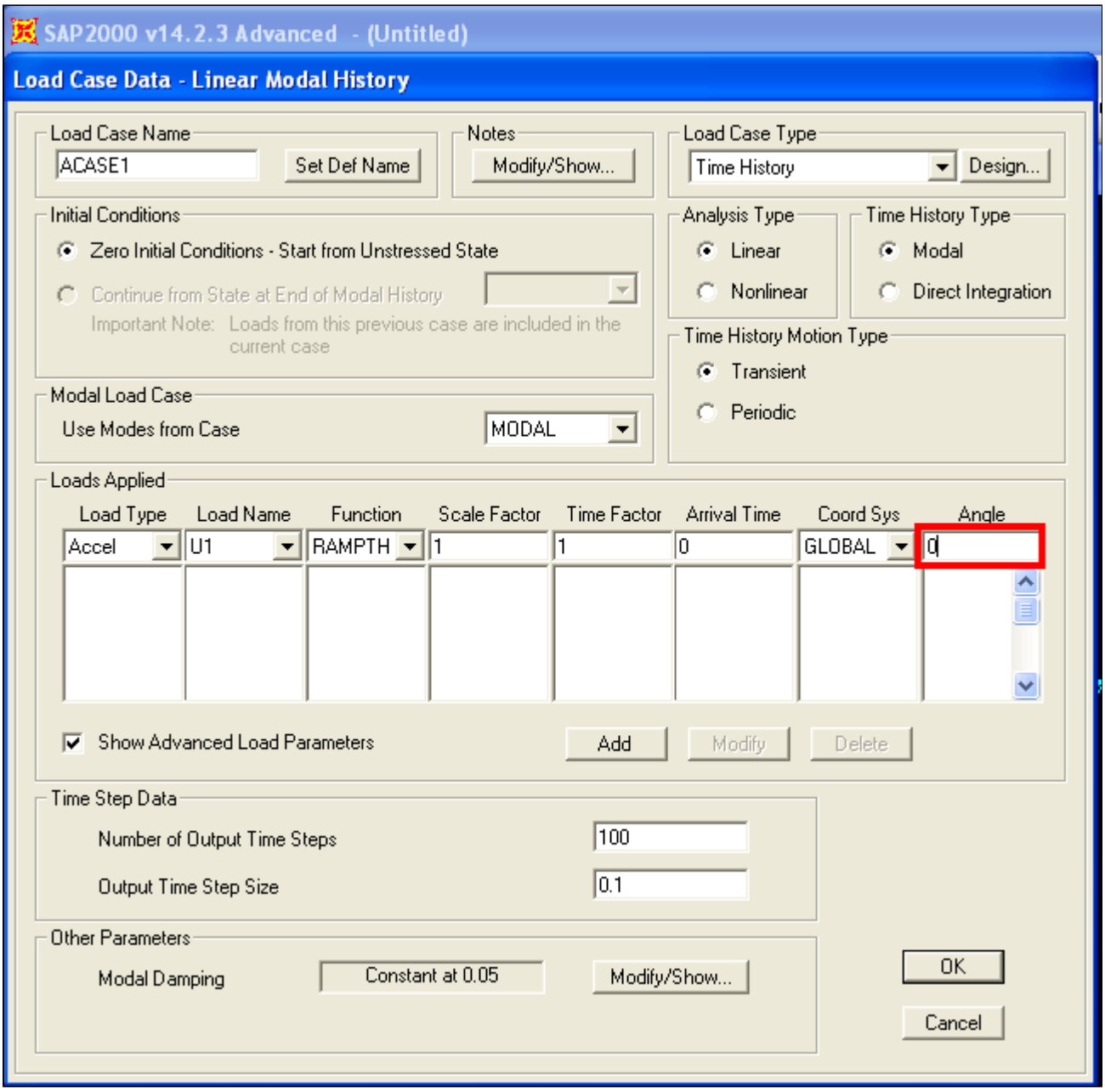


Figure 1 - Angle specification for time-history acceleration load

For other types of load cases, including static, modal, and buckling, acceleration load is specified along the global axes. However, **acceleration load** may still be applied in an **arbitrary direction** using either of the following two methods:

- Establish an equivalent system by applying scale factors to acceleration loads which are oriented along global axes. For example, a resultant acceleration load 45° from the global X axis is equivalent to a UX and UY component, each scaled to 0.7071.
- Calculate and apply acceleration loads directly to the joints of a structure, done as follows:

    1. Analyze the model, then display the Assembled Joint Masses table using the Display > Show Tables > Analysis Results > Joint Output > Joint Masses > Table: Assembled Joint Masses option.
    2. Export this table to Excel, then, using joint mass, acceleration magnitude, and acceleration direction, calculate the acceleration-load global-axes components at each joint.
    3. Within a load case, apply the calculated acceleration loads using the Edit > Interactive Database Editing > Model Definition > Joint Assignments > Joint Load Assignments > Table: Joint Loads - Force option. Users may export this table to Excel, edit, then import back to the analysis software.

See Also

- **Tables** – Interactive database editing
- Context Help for acceleration-load application