Nonlinear viscous damping

Link objects are very well suited for modeling the nonlinear force-velocity relationship of viscous damping. The damping properties of nonlinear viscous dampers are based on the Maxwell model of viscoelasticity (Malvern, 1969), and may be specified for each deformational degree-of-freedom (DOF). Those DOF without nonlinear specification will remain linear by using effective stiffness, which may be zero. Additional information is available in the CSI Analysis Reference Manual (Chapter XV The Link/Support Element, Nonlinear Viscous Damper Property).

Two sets of properties are available to dampers, including:

- **Linear properties**, where Effective Stiffness and Effective Damping may be specified for linear analysis cases. By default, these parameters are modeled in parallel.

- **Nonlinear properties**, where Stiffness, Damping Coefficient, and Damping Exponent are specified, and modeled in series. A linear link object is most suitable unless nonlinear damping is assigned using a Damping Exponent other than 1.0. This enables the modeling of a linear dashpot in parallel with linear stiffness for both linear and nonlinear analysis cases.