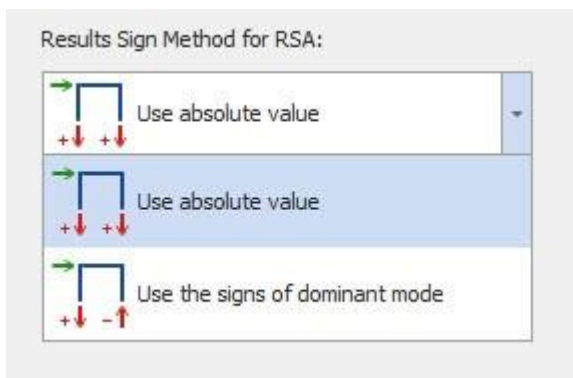


# Results Sign Method for Response Spectrum Analysis

Response Spectrum Analysis calculates and combines the pseudo maximum responses of natural vibration modes against a given design spectrum by assuming each mode as an independent single degree of freedom system. During the combination of modal result vectors, the sign of the displacements and internal forces are lost and hence equilibrium condition is not satisfied anymore. If you check the deflected shape of the structure under response spectrum load cases, you may see weird displaced shapes due to this fact. Also, internal force diagrams will always be positive after the combination. This is the expected behavior and natural output of response spectrum analysis.

Most of the time, this is easily overcome during the design by combining RSA load cases with dead and live load cases using both negative and positive coefficients. However, for deflection checks and other structural checks, you may need the signs of the internal forces and deflections.

For this purpose, ProtaStructure hosts a setting to either use the '**Absolute Values**' or '**Sign of Dominant Mode**' for RSA result signage.



If dominant mode signs are used for overall RSA results then the dominant mode will be selected depending on its mass participation in a certain DOF and the sign of that mode will be used for the particular RSA load case in the relevant direction. This approach may yield unexpected results in highly irregular structures where the dominant mode is a torsional mode or translational mode with high coupling.