Frame to shell connections

Test Problem

Name:	Frame to shell connections
Description:	This tutorial describes the application of connections between frame and shell elements.
Program:	SAP2000
Version:	12.0.0
Model ID:	na

A shell object, simply supported at its corners, is shown on the left side of Figure 1. The images on the right side present the same shell object with an edge beam along its side.

Question

These shell objects are meshed using 4x4 sub-elements, though no connection is created between the shell and the edge beam. Given this condition, I would expect the shell and beam to deflect independently from one another. However, the deflection contours indicate that the beam stiffens the system against out-of-plane behavior. Is there an explanation? And how are these components modeled to behave independently?
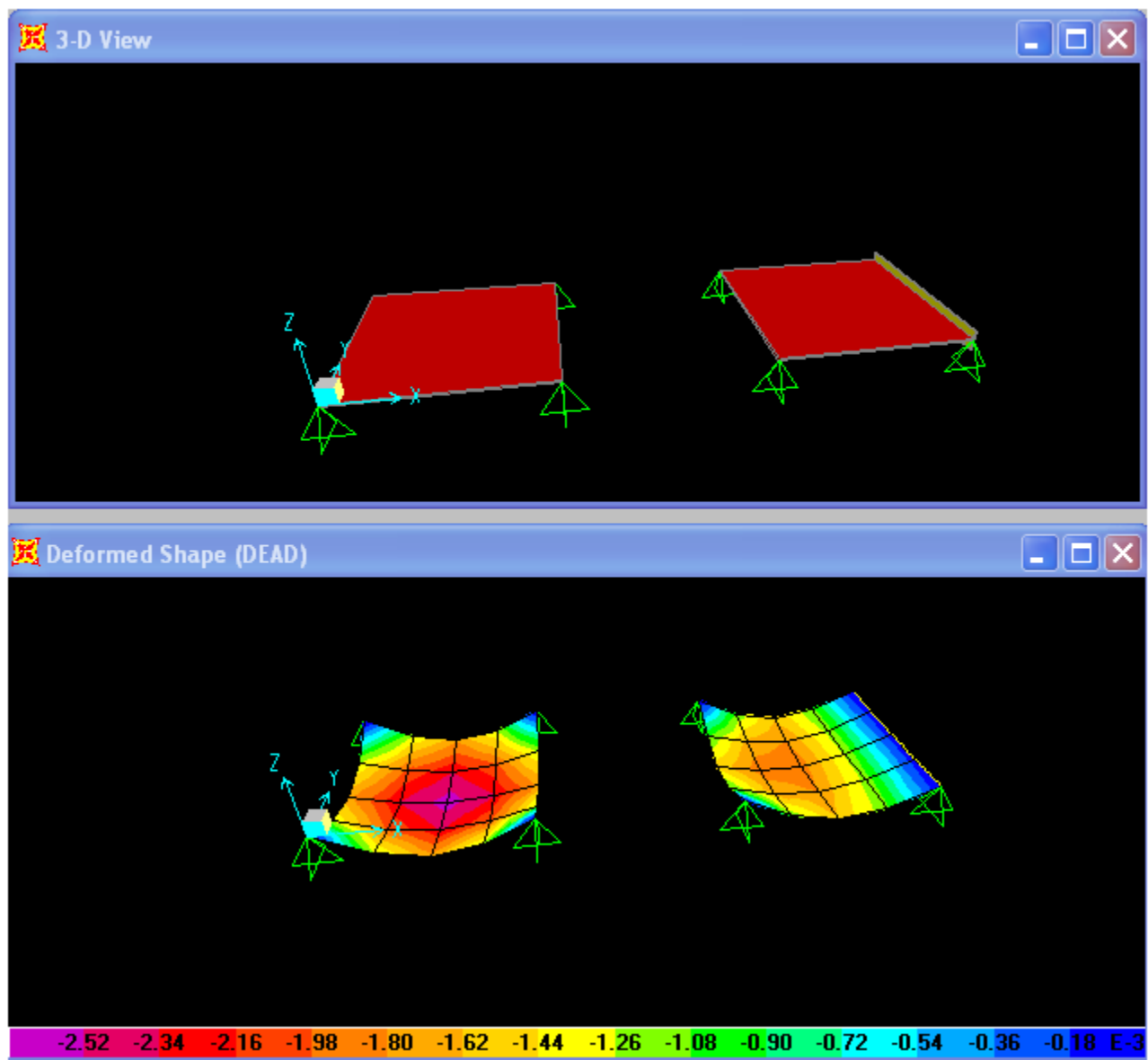
Figure 1 - Shell model and deflection with and without edge beam

Answer

When frame and shell objects are meshed, joints are created along their interface, then merged by default. If this connection is not desired, divide the objects explicitly, then select the merged joints which were automatically created. Select Edit > Point > Disconnect to create duplicate joints at the same location. Selected degrees of freedom (DOF) may then be reconnected, if desired, using weld constraints.

Attachments

- SAP2000 V12.0.0 model (zipped SDB file)