Tendon force vs. frame response

Test Problem

Name:	Tendon force vs. frame response
Description:	Tendon application is validated by comparing tendon forces to those in an equivalent frame system.
Program:	SAP2000
Version:	12.0.2
Model ID:	na

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Overview

The model attached contains four separate structures, shown below in Figures 1 and 2, and listed as follows:

- Two-span bridge created using the bridge modeler
- Two-span bridge created manually
- One-span bridge created using the bridge modeler
- One-span bridge created manually

All four structures have the following properties:

- Each span length is 10m.
- Concrete deck sections are 0.5m deep and 3m wide.
- Simply-supported conditions are at each abutment and bent.
- A straight tendon, 25mm in diameter, runs along each length. Tendons are prestressed to 10kN (without losses) and located 0.05m from the bottom of each section.

The purpose of this model is to:

- Determine and review internal forces resulting from prestressing.
- Verify the prestressing forces used for flexural design check.
- Compare frame-element forces to the prestressing forces, found through the Display > Show Bridge Forces/Stresses menu.
- Define a section cut through the frame and tendon, review forces, and compare with frame and tendon response at section cut locations.

Model screenshots

Flexural response is depicted in Figures 1 and 2:

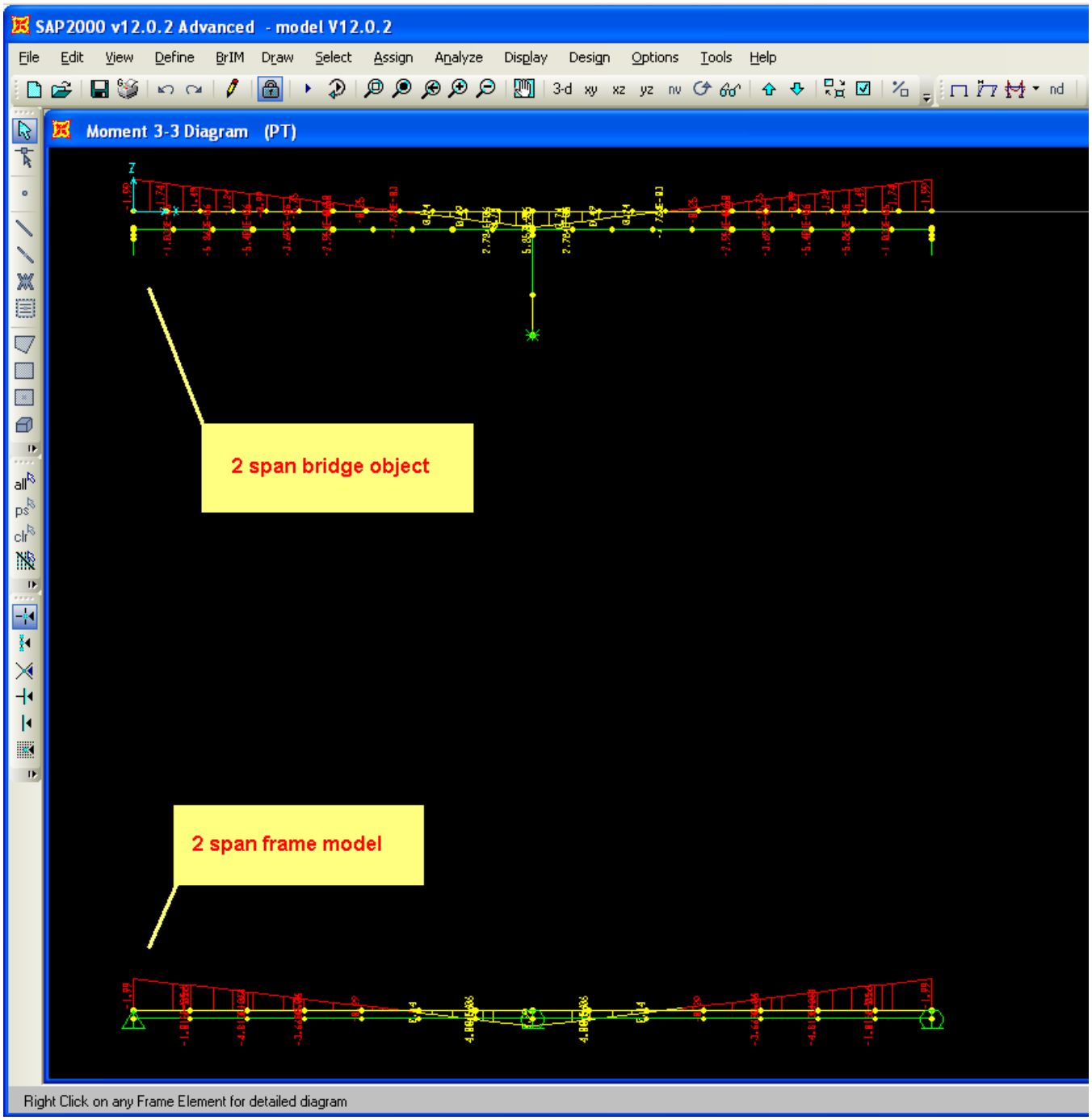


Figure 1 - Moment diagram, two-span bridge with tendon

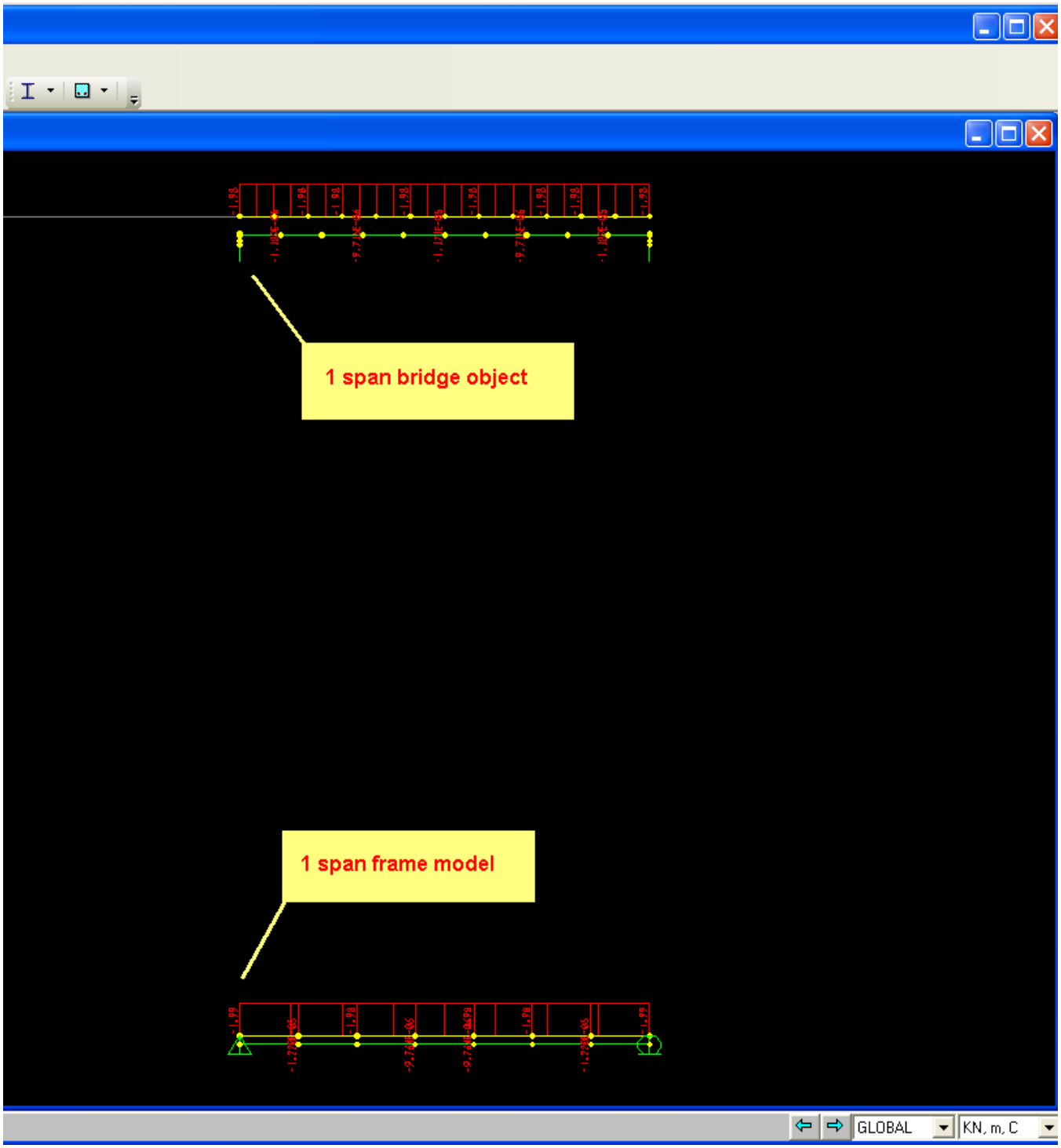


Figure 2 - Moment diagram, one-span bridge with tendon

Section cuts reveal that individual element forces closely correlate with those induced by prestressing.

See Also

- Hyperstatic forces for bridge-object superstructures test problem

Attachments

- SAP2000 V12.0.2 model (zipped .SDB file)