

**Example 26: Verifying continuous beam**

**1 Description of the problem**

To verify the mathematical model of *ELPLA* for analyzing continuous beams, results of a continuous beam introduced by *Harry* (1993), Examples 10.2, 10.4 and 10.5, pages 399, 409 and 411, are compared with those obtained by *ELPLA*.

A continuous beam of length  $L = 35$  [m] is chosen as shown in Figure 61. The beam is subjected to a point load of  $P = 500$  [kN] at the center. The beam cross section yields Moment of Inertia  $I = 0.003$  [m<sup>4</sup>]. *Young's* modulus of the beam is  $E_b = 2.0 \times 10^8$  [kN/m<sup>2</sup>].

For the comparison, three different cases are considered as follows:

- Case a: Continuous beam with a point load  $P$  at the center on supports at points  $a$ ,  $b$ ,  $d$  and  $e$
- Case b: Instead of the point load  $P$  at the center of the beam, points  $a$ ,  $b$ ,  $d$  and  $e$  have the following support settlements:  $\Delta a = -2.75$  [cm],  $\Delta b = -4.75$  [cm],  $\Delta d = -2.2$  [cm] and  $\Delta e = -1.0$  [cm]
- Case c: Points  $b$  and  $d$  are supported by elastic springs that have stiffness of  $k_{sb} = k_{sd} = 3600$  [kN/m]

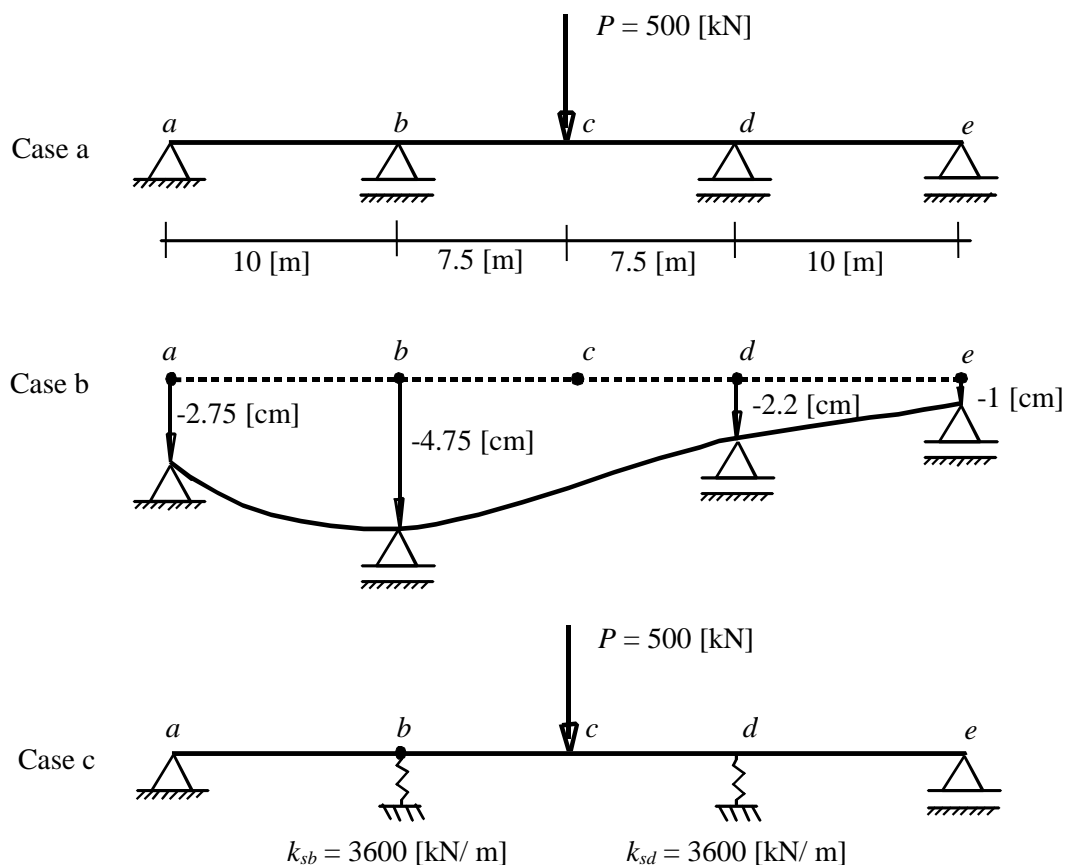


Figure 61 Continuous beam with dimensions and load

## 2 Comparison of Results

Moments and shear forces for case a obtained by *ELPLA* are compared with those obtained by *Harry* (1993) in Figure 62. Results obtained by *ELPLA* and *Harry* (1993) for case a are the same. Figure 63 compares between moments computed by *Harry* (1993) and *ELPLA* for case b. This figure shows that both results are in a good agreement. For case c, the reaction at the elastic support obtained by *Harry* (1993) and *ELPLA* is equal to 272.9 [kN].

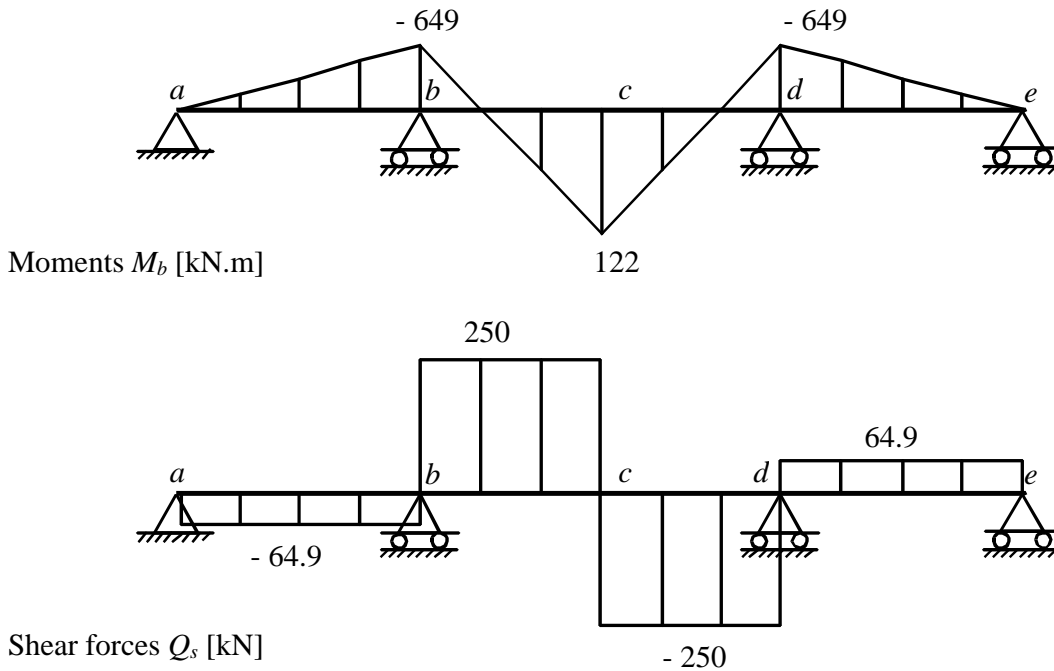
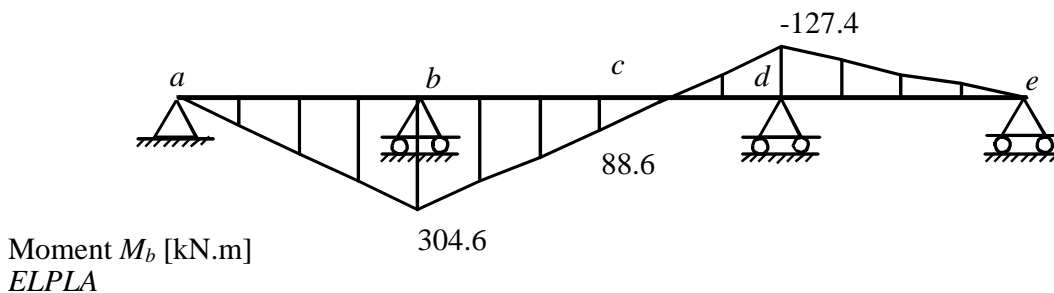
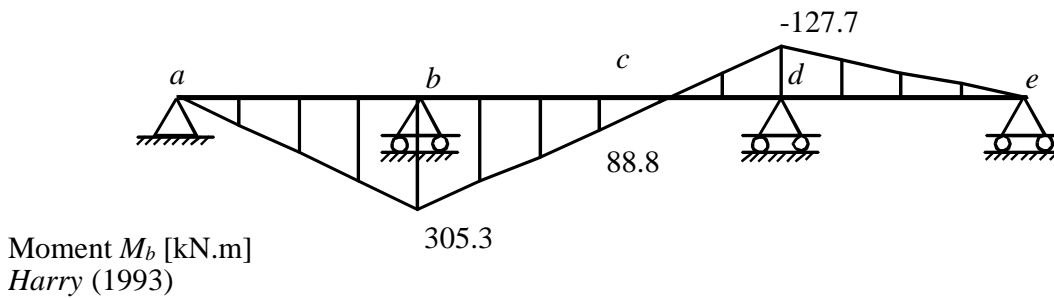


Figure 62 Moments and shear forces computed by *Harry* (1993) and *ELPLA* for case a



Examples to verify and illustrate *ELPLA*

Figure 63 Comparison of moments computed by *Harry* (1993) and *ELPLA* for case b