Now we consider a bilevel programming with three followers in which the leader has a decision vector (x_1, x_2, x_3) and the three followers have decision vectors (y_{i1}, y_{i2}), $i = 1, 2, 3$,

$$\begin{cases} \max\limits_{x_1,x_2,x_3} y_{11}^* y_{12}^* \sin x_1 + 2y_{21}^* y_{22}^* \sin x_2 + 3y_{31}^* y_{32}^* \sin x_3 \\ \text{subject to:} \\ \qquad x_1 + x_2 + x_3 \le 10,\ x_1 \ge 0,\ x_2 \ge 0,\ x_3 \ge 0 \\ \qquad (y_{11}^*, y_{12}^*, y_{21}^*, y_{22}^*, y_{31}^*, y_{32}^*) \text{ solves the problems} \\ \qquad \begin{cases} \max\limits_{y_{11},y_{12}} y_{11} \sin y_{12} + y_{12} \sin y_{11} \\ \text{subject to:} \\ \qquad y_{11} + y_{12} \le x_1,\ y_{11} \ge 0,\ y_{12} \ge 0 \end{cases} \\ \qquad \begin{cases} \max\limits_{y_{21},y_{22}} y_{21} \sin y_{22} + y_{22} \sin y_{21} \\ \text{subject to:} \\ \qquad y_{21} + y_{22} \le x_2,\ y_{21} \ge 0,\ y_{22} \ge 0 \end{cases} \\ \qquad \begin{cases} \max\limits_{y_{31},y_{32}} y_{31} \sin y_{32} + y_{32} \sin y_{31} \\ \text{subject to:} \\ \qquad y_{31} + y_{32} \le x_3,\ y_{31} \ge 0,\ y_{32} \ge 0. \end{cases} \end{cases}$$

A run of GA with 1000 generations shows that the Stackelberg-Nash equilibrium is

$$\begin{aligned} (x_1^*, x_2^*, x_3^*) &= (0.000, 1.936, 8.064), \\ (y_{11}^*, y_{12}^*) &= (0.000, 0.000), \\ (y_{21}^*, y_{22}^*) &= (0.968, 0.968), \\ (y_{31}^*, y_{32}^*) &= (1.317, 6.747) \end{aligned}$$

with optimal objective values

$$\begin{aligned} y_{11}^* y_{12}^* \sin x_1^* + 2y_{21}^* y_{22}^* \sin x_2^* + 3y_{31}^* y_{32}^* \sin x_3^* &= 27.822, \\ y_{11}^* \sin y_{12}^* + y_{12}^* \sin y_{11}^* &= 0.000, \\ y_{21}^* \sin y_{22}^* + y_{22}^* \sin y_{21}^* &= 1.595, \\ y_{31}^* \sin y_{32}^* + y_{32}^* \sin y_{31}^* &= 7.120. \end{aligned}$$