The hydraulic operation of a lock with separate water-saving basins and introduction of water through the chamber bottom, adopted as the reference solution during the preliminary design studies of the Seine-Nord Europe Canal, has been studied using numerical and physical models. These studies were used to size the chamber water supply system and define the most suitable design for the gate chamber controlling flows between the water-saving basins and the lock chamber. The 1:25 scale model built for the lock with the largest drop height (30 m) enabled the numerical simulation results to be validated and fine-tuned, and certain operating parameters to be optimised.

The phenomenon of surge waves in the reaches, related to the rapid filling and emptying of large locks (in spite of the fact that most of this water volume is exchanged between the chamber and the water-saving basins in a closed circuit) means that special measures must be taken to maintain navigation conditions in the canal. Of the possible solutions, the one proposed at this stage of the project consists, firstly, in limiting the discharges exchanged between the chamber and the canal, which is a means of controlling the initial surge wave but restricts possibilities for speeding up lockage, and secondly, in creating damping basins along the reaches, preferably alongside the locks, in order to reduce the amplitude of the resulting waves in the canal.

SUMMARY

The hydraulic operation of a lock with separate water-saving basins and introduction of water through the chamber bottom, adopted as the reference solution during the preliminary design studies of the Seine-Nord Europe Canal, has been studied using numerical and physical models. These studies were used to size the chamber water supply system and define the most suitable design for the gate chamber controlling flows between the water-saving basins and the lock chamber. The 1:25 scale model built for the lock with the largest drop height (30 m) enabled the numerical simulation results to be validated and fine-tuned, and certain operating parameters to be optimised.

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