Conclusions

The design process for a hydraulic crane is highly iterative and a number of iterations are needed to achieve a satisfactory design. The design of a system, containing subsystems from hydraulic and mechanical domains is difficult, and the modeling technique must take into account their interaction in operational performance. The hydraulic actuators, controlling the moving crane elements, have their own dynamics due to the presence of inertial parameters of their elements and the compressibility of the hydraulic oil. The internal forces, which arise in the mechanical system during performance of typical operations, and the pressures and flows in the hydraulic system, are important for the reliability and strength calculations of the crane elements. The main direction for the improvement of the system performance is the implementation of a control system for minimizing the payload swinging, especially for the slewing motion.

The performed validation of the developed dynamical model shows its applicability for the study of the hydraulic crane motion simulation, considering large angles of payload swinging and taking into account the hydraulic driving system dynamics.