

## **PERFORMANCE SIMULATION OF MUD PUMP VALVE WITH A DAMPER CHAMBER BY FINITE ELEMENT METHOD**

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### **Summary**

The valve and seat in modern mud pumps for oil and gas well drilling are expendable pump parts. New types of valve with a damper chamber without rubber or polyurethane seal and with metal-to-metal contact area and heavy-duty load bearing capacity have been elaborated. Lighter weight body of plate characterizes this design. In comparison with the valve of ordinary construction a valve with a damper chamber contains additional structural elements, which in the moment of setting on of the plate forms the chamber of the promoted pressure between a seat and plate. It is considered that application of damper chamber will decrease the shock loadings or a "hammer-effect" at the setting of plate. However, for development of reliable working construction it is necessary to resolve next basic problems: 1. To calculate the optimum size of clearances in damper chamber. 2. To define speed of landing of plate at the entrance in a damper chamber. 3. To overcome hydroabrasive wear in the clearances of damper chamber as a result of high speeds of mud flow. It is possible to resolve first two problems by the mathematical model of work of mud pump valve with a damper chamber. For possibility of resolving of mathematical model it is necessary to define the coefficient of discharge in valve by the computer design of fluid flow, as a nonlinear function depending on the height of getting up of plate above a seat. The computer three-dimensional parametric model of valve with a damper chamber has been developed for the valve assembly of triplex single action pump. A parametric model give a possibility to change the height of getting up of plate  $H$  and the geometrical parameters of seat and plate and clearances in damper chamber. By a programmatic com

