



International Summer School 2013

Selected issues of safety engineering and exploitation of nuclear power plants in the context of EU energy policy

Trnava, 1-12.09.2013

nuclear reactor simulator

” Thermal and hydraulic calculation of VVER1000 nuclear reactor in Temelin”

Laboratory is devoted to simulate and analysis of thermal and hydraulic calculation of VVER1000 nuclear reactor in Temelin.

Exercise 1. Thermal analysis of the primary and secondary circle under normal working parameters

Analyze the pressure, temperature and position of the control rods for various values of the unit power: 100% 80%, 60%. Observe the communicates generated by the control system.

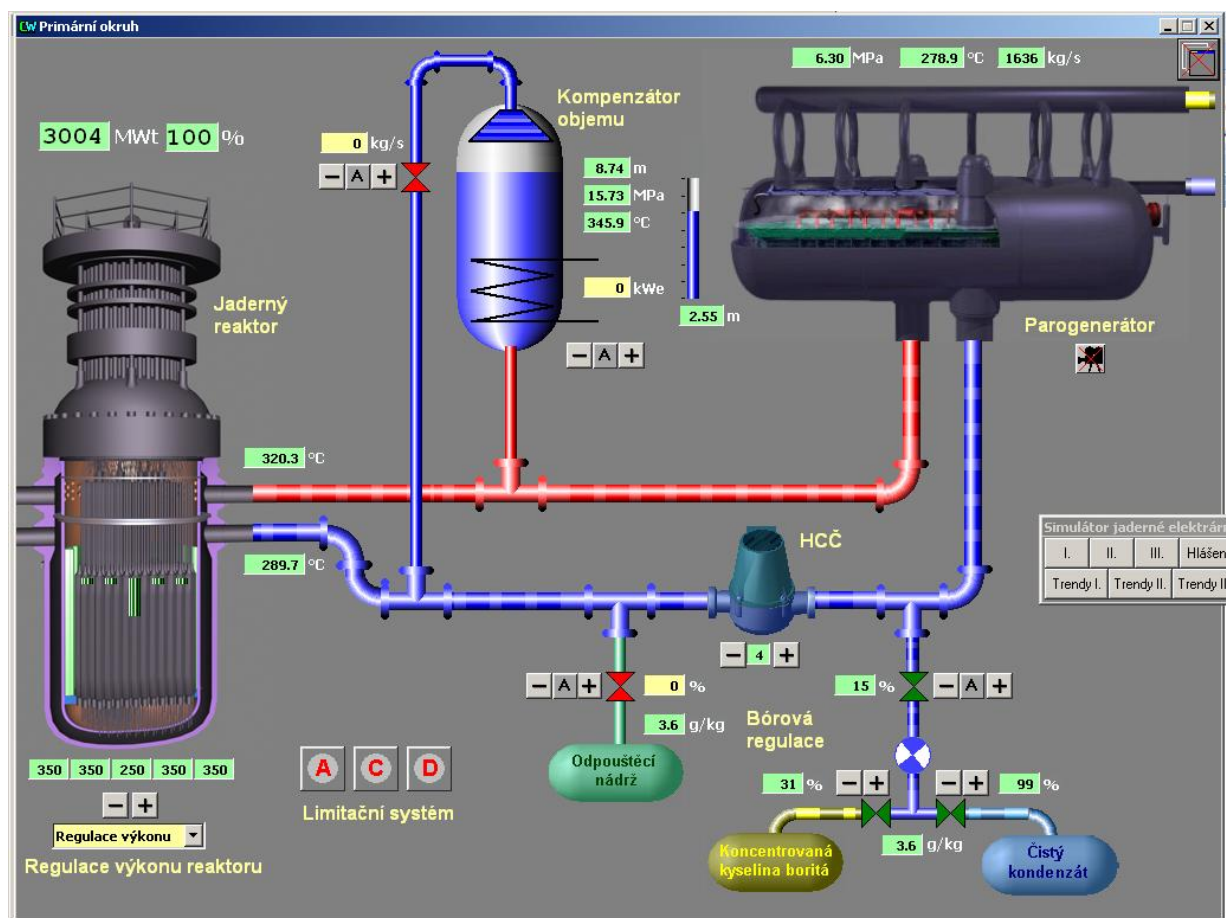


Figure 1. Thermal-flow parameters in primary circle

Change the regulation limit from A to B next to C and try to slowly decrease the power of the reactor. Observe and comment the information and alerts generated by the control system.

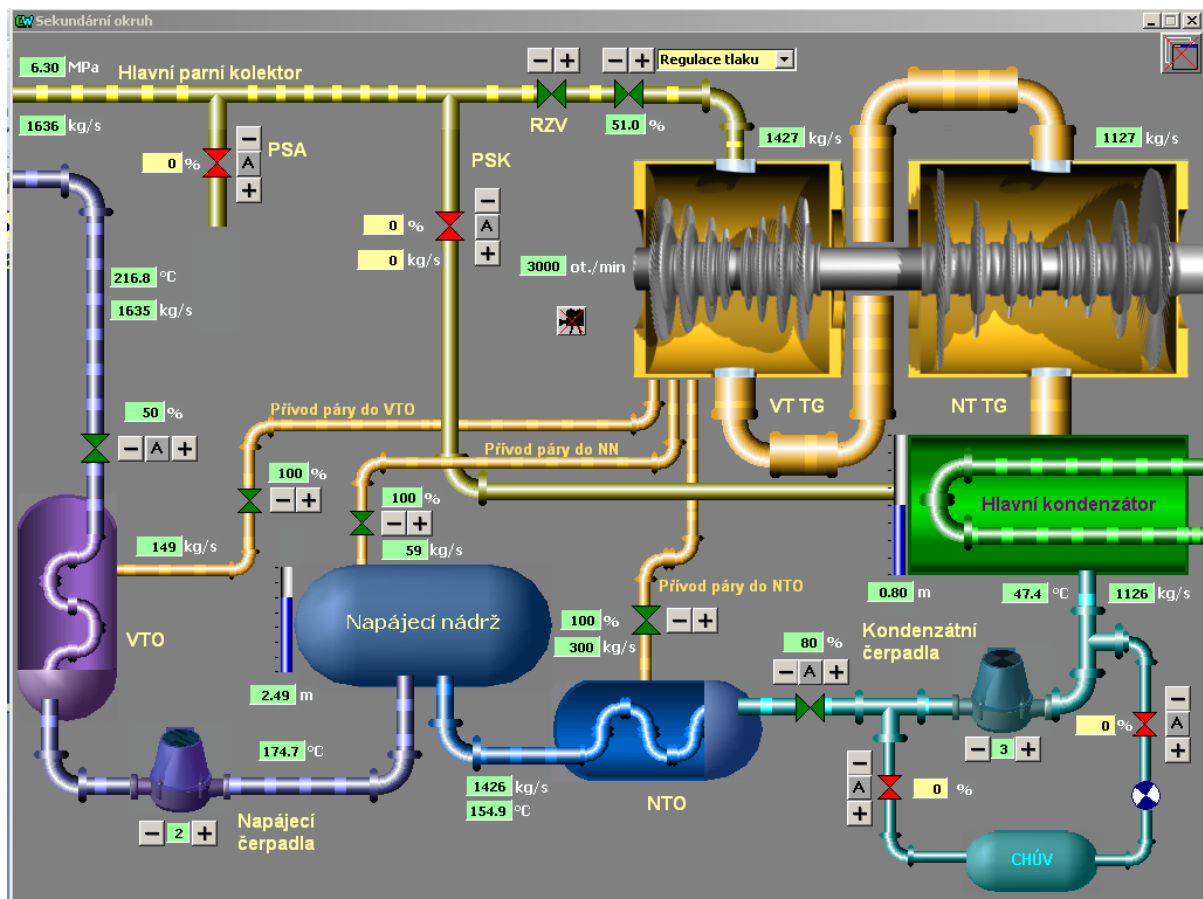


Figure 2. Thermal-flow parameters in secondary circle

Exercise 2. Shut down the reactor using:

- Boric acid
- Position of the control rods

Find the minimum stable value of the reactor power.

- Analyze the response of the control system on manual regulation of the amount of boric acid.
- Analyze the relationship between the position of the control rods and power of the reactor.
- Analyze the thermal-flow parameters of the system for various power of the reactor.

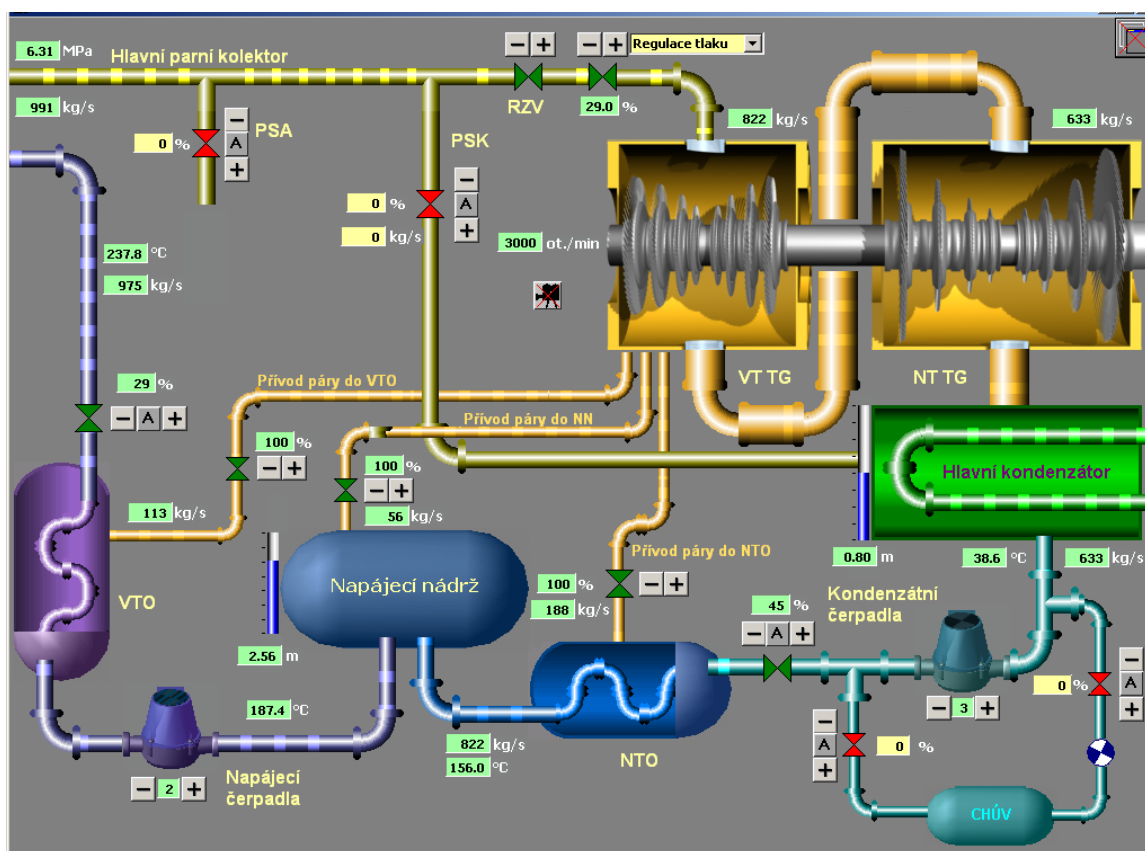
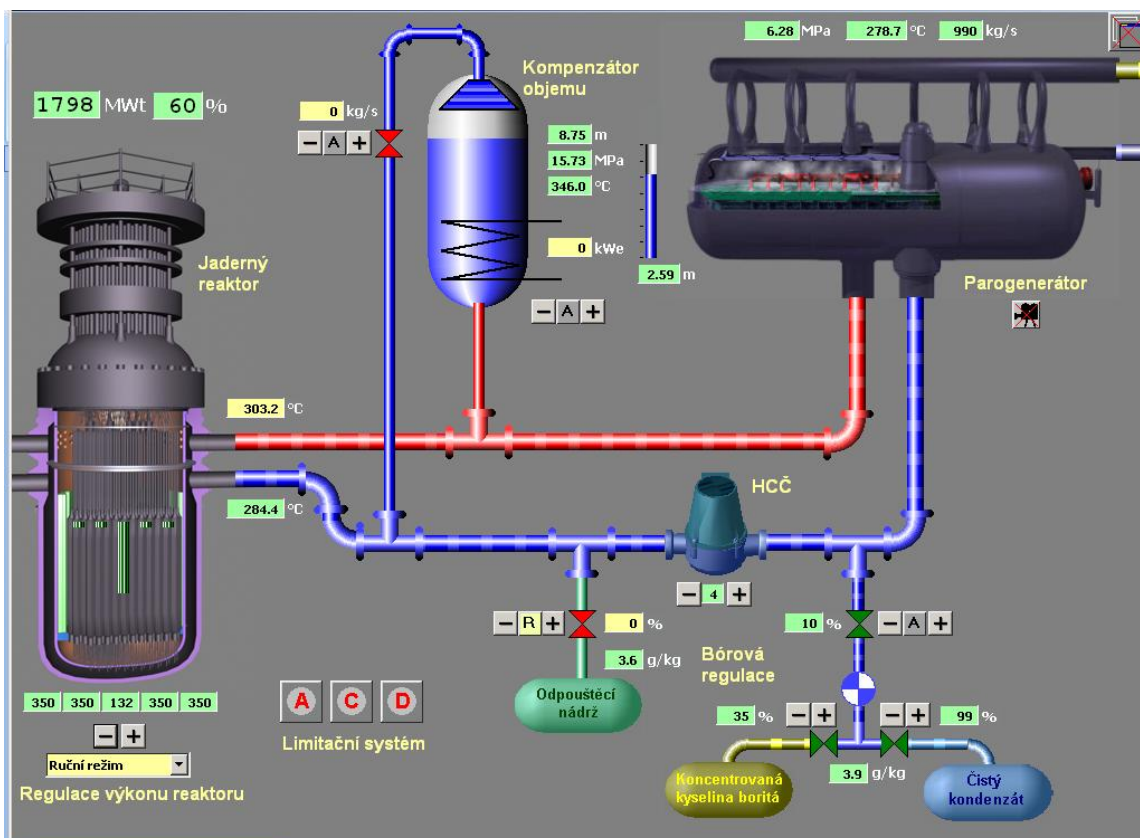


Figure 3. Thermal-flow parameters in primary and secondary circle
for 60% of the unit power

Exercise 3. Start the reactor from 0 to 100% of the power. Phase the turbine with generator for 3000 rpm.

- Starting the reactor observe how changes the thermal-flow parameters in primary and secondary circle. Analyze the pressure and temperature with increase of power.
- Analyze the role of pressurizer in the primary circle.
- Analyze the steam circulation system in secondary circle.
- Analyze the work of turbine during phasing operation
- Analyze the influence of ambient temperature of third circle parameters.

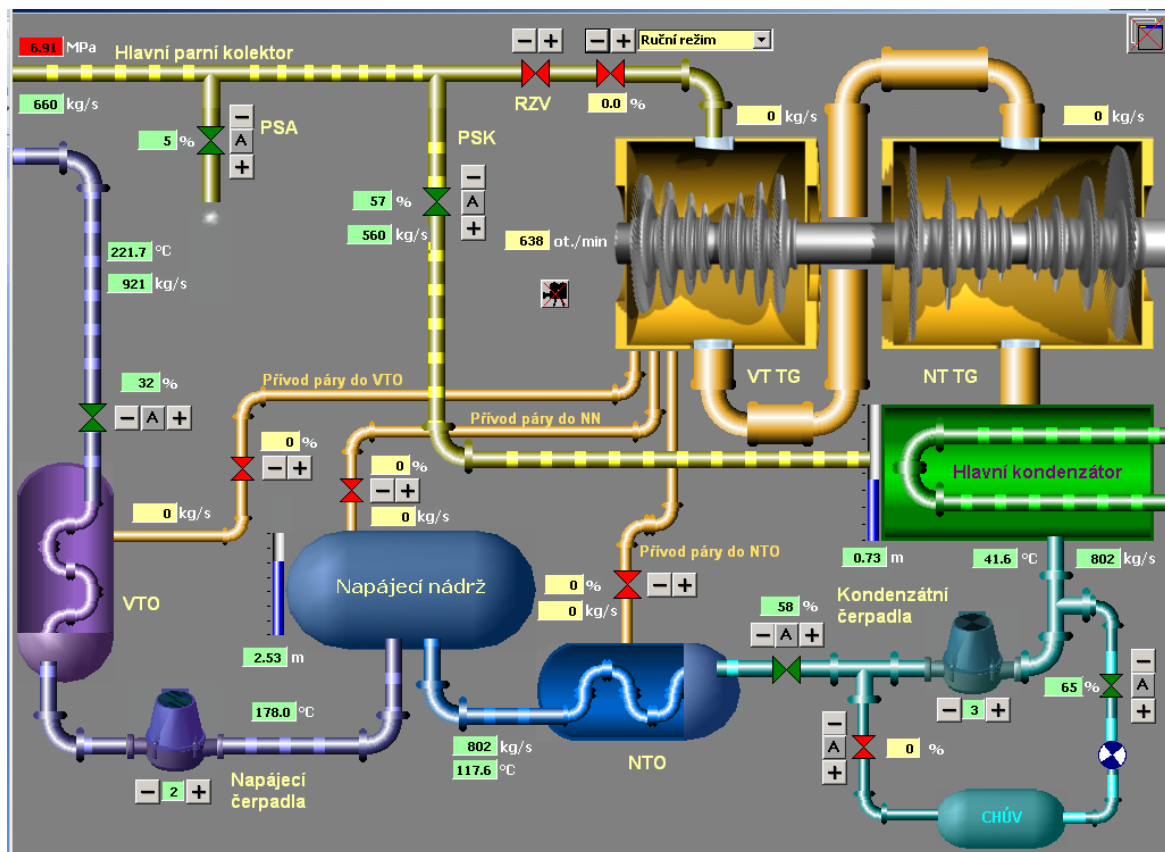


Figure 4. Thermal-flow parameters in secondary circle under phasing operation

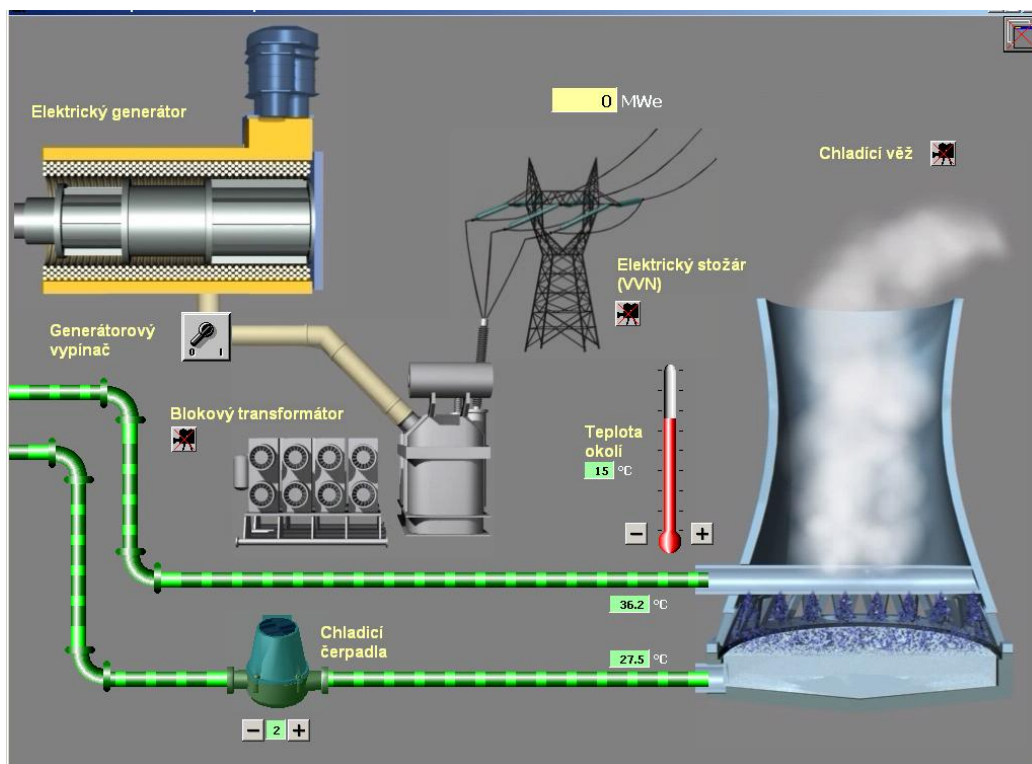


Figure 5. Third circle under phasing operation. Parameters of the unit (below)

