Exercise 8: Artificial bladder 2

- File/Open/ (open solution exercise 7 from moodle: bladder1.mph)
- Global Definitions/Parameters/ V0_intBladder: V_sph, bulkModulus: 2.2 [GPa], p0_intBladder: 1 [atm], p_extBladder: 1 [atm]
- Component/Definitions/(right click)/Components Couplings/Integration/ Operator name: Vintegration, Geometry entity level: Boundary, Selection: inner arc circle of the bladder
- Component/Definitions/(right click)/Variables/ V_intBladder: 2*Vintegration(-pi*r*r*solid.nr), p_intBladder: p0_intBladder + bulkModulus *(V0_intBladder/V_intBladder -1)
- Solid Mechanics/(right click)Boundary Load/ Selection: inner arc circle of the bladder, Load type: pressure, p: p_intBladder
- Solid Mechanics/(right click)Boundary Load/ Selection: outer arc circle of the bladder, Load type: pressure, p: p_extBladder
- Extend prescribed displacement 20 mm
- Compute
- Convergence problem ? → Study 1/Solver configurations/Solution 1/Dependent variables 1/Displacement field/Method: automatic
- Results/Derived Values/Integration/Surface Integration/ Selection: plate, Expression: -solid.RFz (Evaluate again in a new table). Rename new table as “Reaction force (with fluid)”.
- Add curve to compare to the previous two. Results/Reaction force/Table graph/Table: Reaction force (with fluid). Compare the three curves.
- Results/Derived Values/(Right click)Global Evaluation/ Expression: p_intBladder-p0_intBladder, Unit: mmHg. Evaluate in a new table. Rename new table as deltaPressure
- Plot deltaPressue, and evaluate the value of para corresponding to 200 mmHg by zooming where le curve cross 200 mmHg → reaction force: 135.5 N
- Alternatively, you can export the 2 tables in MATLAB, create an interpolating function and solve the force for a pressure of 200 mmHg.