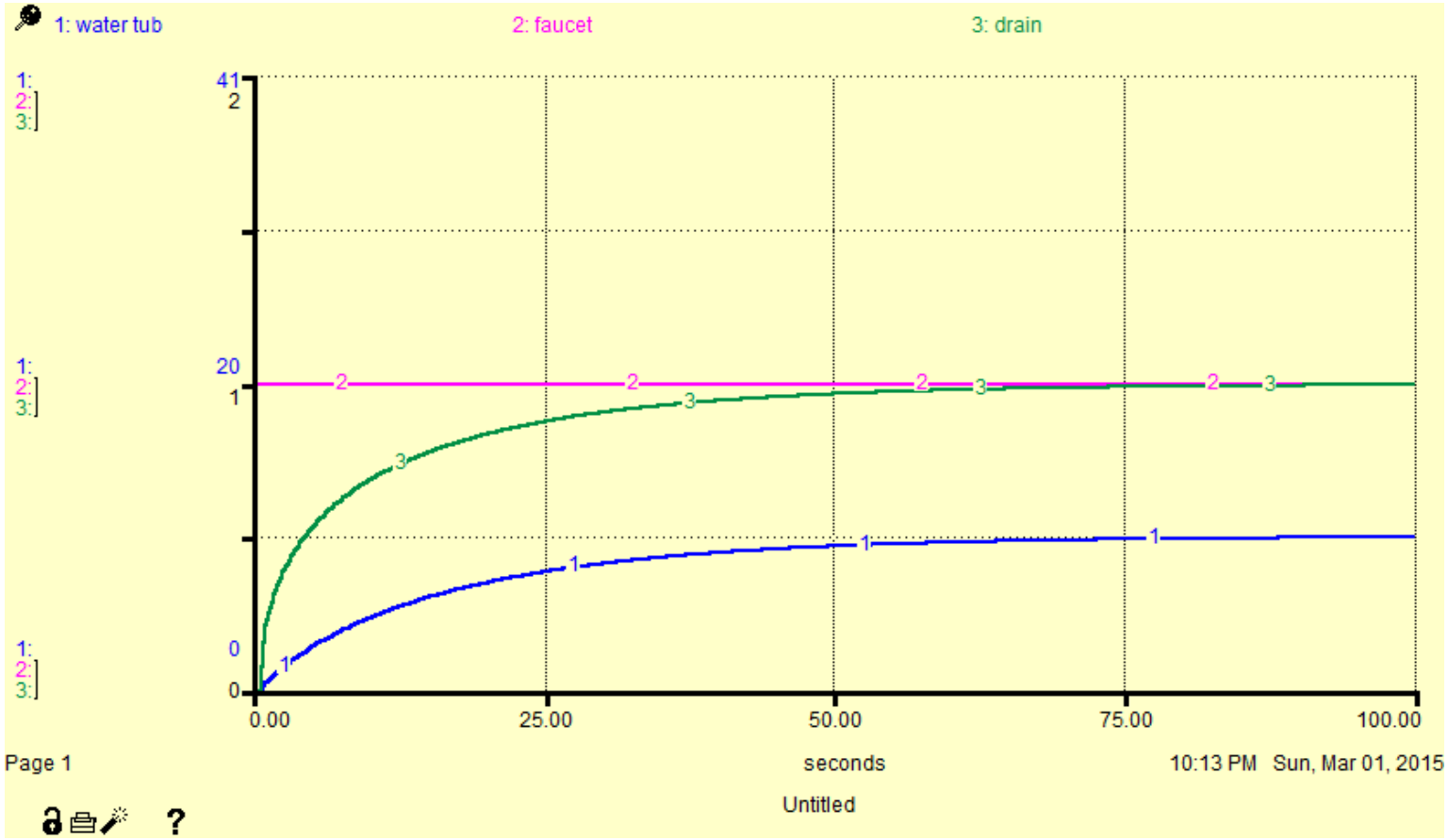
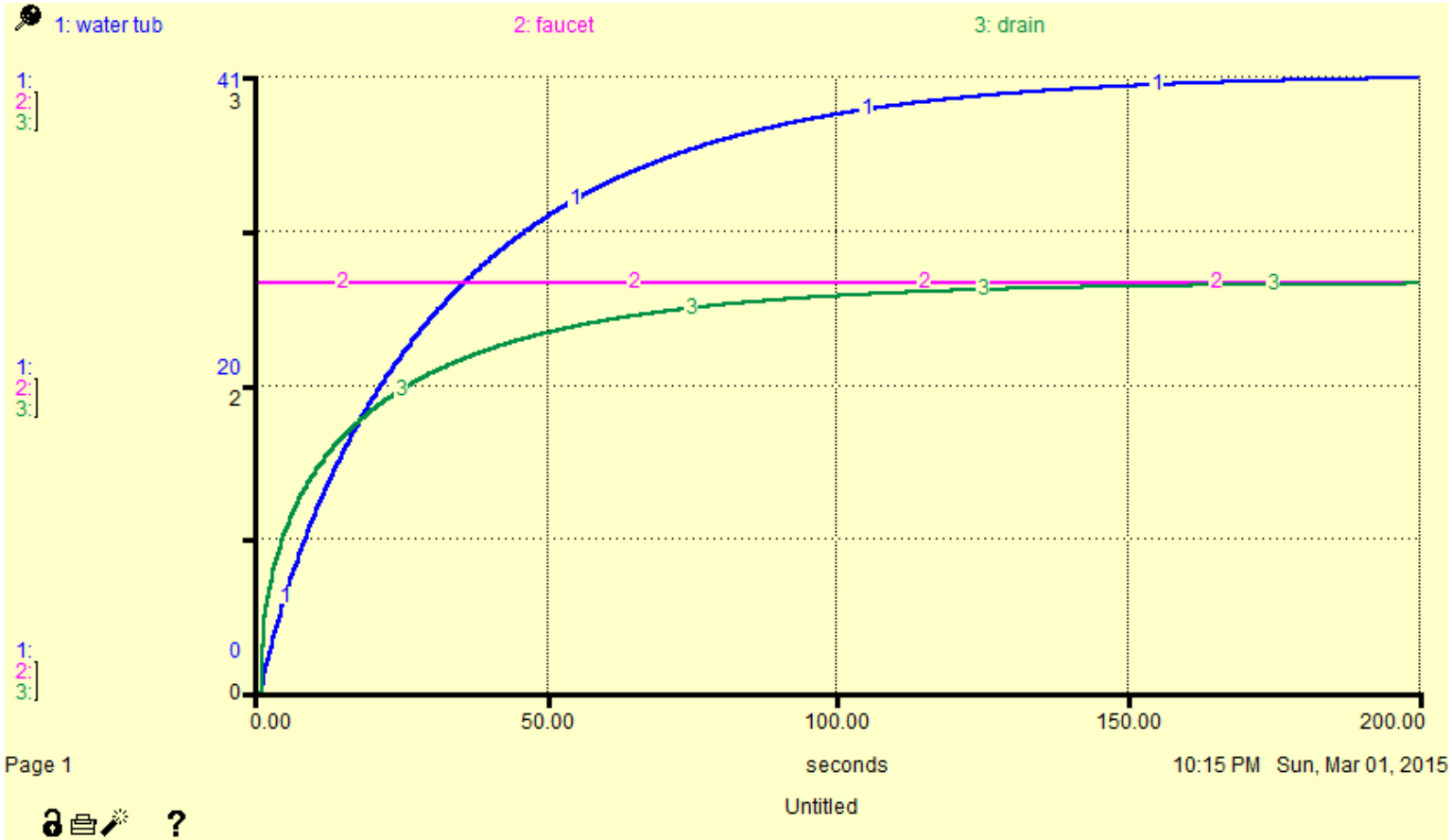
Introduction to Systems Modeling

1. Set-up model and run to steady-state

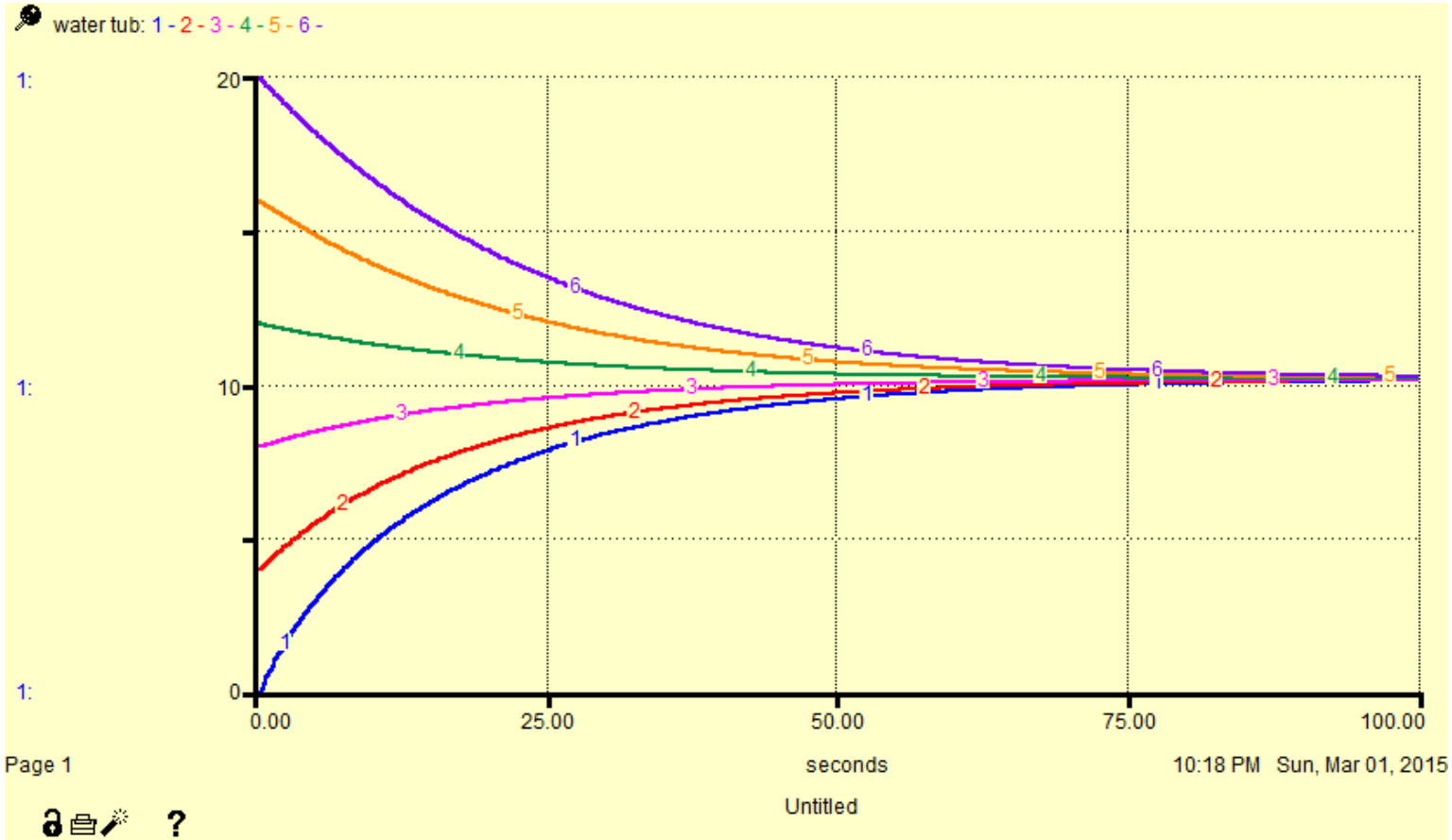


2. Residence times



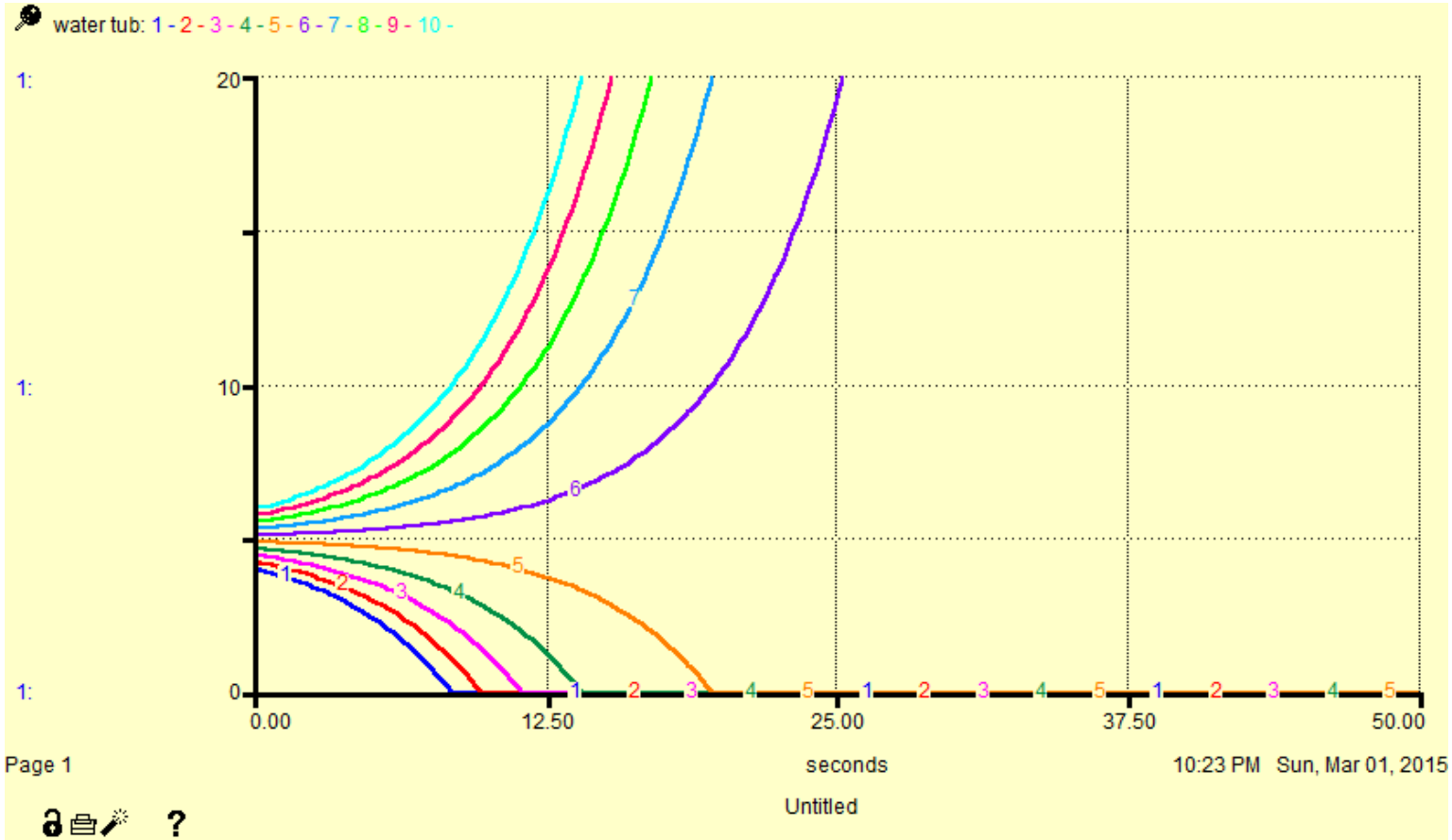
- Residence time = Reservoir volume / inflow
- Doubling the inflow increase the reservoir by a factor of 4, so the residence time doubled

3. Response times



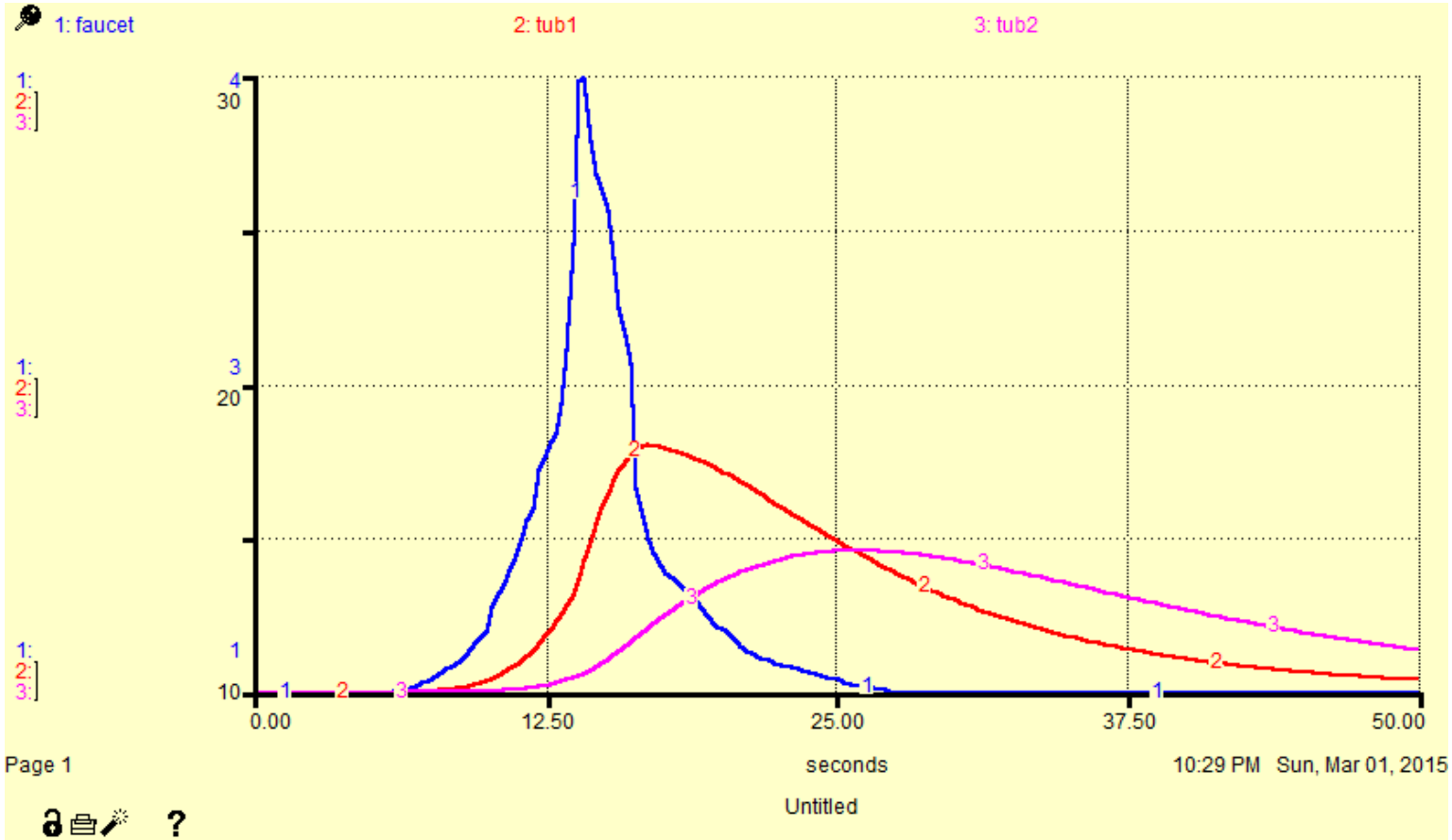
- Longer recovery time for larger perturbation
- But curvaturve of graphs is similar for all perturbations
- Note that this model has a strong negative feedback

4. Positive feedback loops



- The model becomes unstable when inflow is proportional to reservoir volume

5. Lag time



- It takes time for changes to propagate downstream
- Same total volume of water, but lower peak discharge downstream
- Commonly observed in many types of systems