

An Open-Source Web Tool for Visualizing Estimates of Well Capture Zones Near Surface Water Features

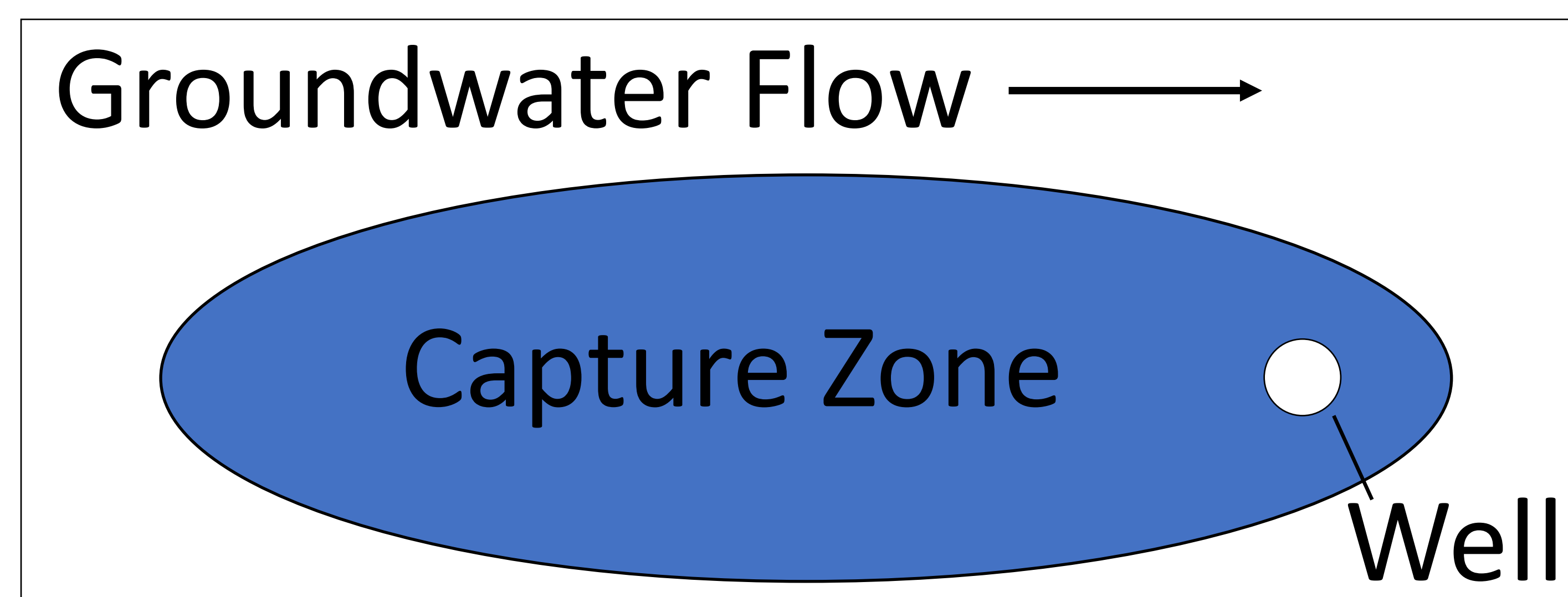
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Introduction

- Protecting groundwater wells from contamination requires an estimate of the well's contribution area (i.e., capture zone)



Methods

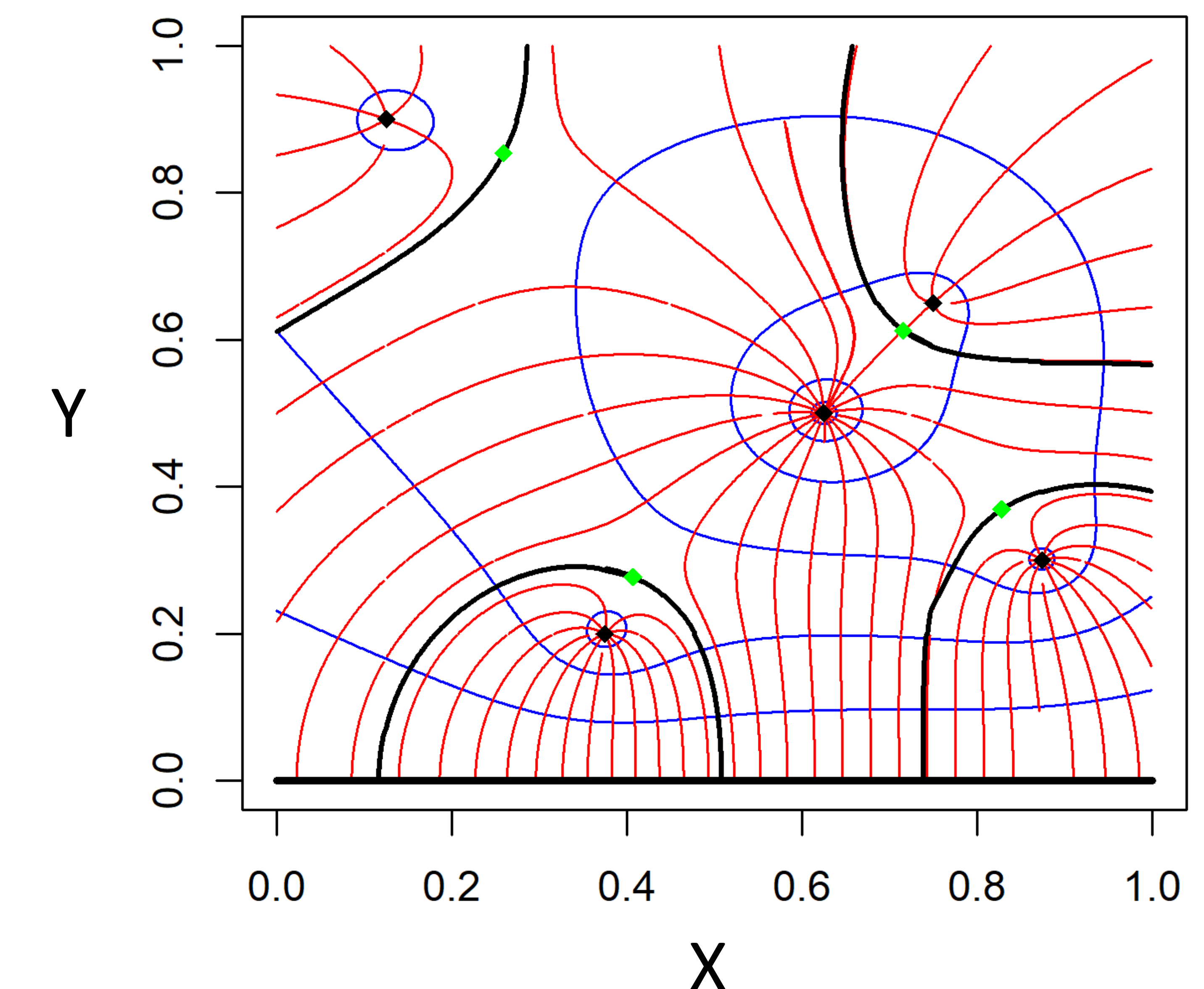
- 2D analytical approach; solve complex equations (Nagheli et al., 2020)
- Remove mathematical artifacts (Holzbecher, 2018)
- Merge segments that go through stagnation points

2D Analytical Method Advantages

- Fast (run time: minutes)
- Few parameters (well coordinates, pumping rates, hydraulic conductivity, and hydraulic gradient)
- Includes surface water features (constant head boundaries)

Results

- Able to re-create demonstration figures from Nagheli et al. (2020)



References

- Holzbecher, E., 2018. Streamline visualization of potential flow with branch cuts, with applications to groundwater. J. Flow Vis. Image Process. 25(2):119–144. DOI: 10.1615/JFlowVisImageProc.2018025918.
- Nagheli, S., Samani, N., Barry, D.A., 2020. Capture zone models of multi-well system in aquifers bounded with regular and irregular inflow boundaries. J. Hydrol. X 7, 100053. DOI: 10.1016/j.hydroa.2020.100053.