A practical example of linearization instabilities in gravitational perturbation theory: Einstein static[1] BOJAN LOSIC, University of British Columbia — I demonstrate how linear approximations to Einstein's equations can sometimes fail to be consistent, owing to linearization instabilities, by considering the example of (stable) inhomogeneous linear fluctuations of an irrotational perfect fluid and metric about Einstein static. By demanding that the linearized solutions be *consistent* in addition to solving the linearized equations of motion, i.e. by demanding linearization stability, it is shown that they must include (unstable) homogeneous fluctuations of comparable amplitude in order that the second order initial value problem be well-posed.

[1]Work done with W.G. Unruh at UBC

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