



## Road network robustness fluctuations over time due to natural and artificial interruptions

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Transportation networks are essential for securing connections among municipalities, enterprises and other important facilities. Blockage of roads cause problems in accessibility. The most important road links within a network are those which, when blocked, caused the most serious problems to the entire network performance. These parts of road networks are the most vulnerable components and have to be kept passable.

We analyzed a part of the state-wide database (period 2010 – 2017) covering all reported road traffic blockages on the Czech road network. We focused on the Zlín region (eastern part of the Czech Rep.) to further demonstrate how the robustness of the network changed over time. There were 1947 records on road blockages, which affected 1023 road links (62 % of the entire Zlín region network). 84 % of blockages lasted less than two hours, but almost 7 % blockages remained for more than one month. 268 road links were blocked once, 133 twice and 210 were blocked between 3 and 10 times. 25 road links were blocked more than eleven-times. Only 69 % road blockages had attributed a cause, however. Traffic crashes were direct cause of 35 % of road blockages, planned road maintenance caused 17 %, snowing 9 % and fallen trees 6 % of road blockages.

Number of blocked links during a day oscillated between 0 and 11. The information can be interesting for an administrator of the network but it does not provide full information about the state of the network. Therefore, we used several relevant robustness measures to analyze daily robustness of the network and thus to objectively measure the impact of the blockages on the network.

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### Related works:

Vodák, R., Bíl, M., Sedoník, J., 2015. Network robustness and random processes. *Physica A* 428, 368–382.