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GAKKOTOSHO
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APPROXIMATING REGIONS OF LINEARIZED MEAN-SQUARE ASYMPTOTIC STABILITY

Florian Rupp
Kutaisi International University,
Youth Avenue, 5th Lane, 4600 Kutaisi, Gerorgia, www.kiu.edu.ge/
Western Caspian University,
31 Istiglaliyyat, Baku 1001, Aserbaidschan, www.wcu.edu.az/
Center of Conflict Resolution, Munich Hub, www.ccr-munich.de/
(E-mail: florian.rupp@kiu.edu.ge)

Abstract. In Ref. [21] we proposed a straightforward basin search algorithm to determine a suitably large level set of the mean-square Lyapunov-function that corresponds to the linearization about an path-wise equilibrium solution of a random ordinary deferential equation (RODE). Here, we apply this basin search algorithm to several RODE example systems to gain insights into their stability as well as escape dynamics (in case of destabilizing noise effects).

Noise intensity plays a crucial role for how similar the behavior of solutions of RODEs is compared to the corresponding deterministic system. Besides determining a local basin of mean-square attraction, the basin search algorithm thus allows to numerically estimate up to which noise intensities linearized mean-square asymptotic stability remains. Moreover, we show the use of mean-square Lyapunov-functions to study escape dynamics once instability arises.

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