CONTINUOUS-STATE BRANCHING PROCESSES WITH SPECTRALLY POSITIVE MIGRATION*

BY

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Abstract. Continuous-state branching processes (CSBPs) with immigration (CBIs), stopped on hitting zero, are generalized by allowing the process governing immigration to be any Lévy process without negative jumps. Unlike CBIs, these newly introduced processes do not appear to satisfy any natural affine property on the level of the Laplace transforms of the semigroups. Basic properties of these processes are described. Explicit formulae (on neighborhoods of infinity) for the Laplace transforms of the first passage times downwards and of the explosion time are derived.

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Key words and phrases: continuous-state branching process, stochastic differential equation, migration, first passage time, explosion, Laplace transform, scale function, Lamperti's time change, spectrally positive Lévy process.

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