Notations

• $e_a$ denotes column vector of 1’s with order $a$;

• $0$ is a vector consisting of 0’s with appropriate dimension;

• $e_r(j)$ denotes column vector of dimension $r$ with 1 in the $j^{th}$ position and 0 elsewhere;

• $e'_r(j)$ denotes the transpose of the column vector of dimension $r$ with 1 in the $j^{th}$ position and 0 elsewhere;

• $I_k$ denotes identity matrix of order $k$.

• $A^{-1}$ denotes the inverse of matrix $A$.

• $A \otimes B$ denotes the Kronecker product of $A$ and $B$.

• $\text{diag}(\alpha)$ denotes diagonal matrix with $\alpha$ as diagonal entry.

• $Z^+$ denotes the set of all positive integers.
Abbreviation used

\( PH \) : Phase type;
\( MAP \) : Markovian Arrival Process;
\( CTMC \) : Continuous-time Markov Chain;
\( QBD \) : Quasi-birth-death;
\( LST \) : Laplace-Stieltjes Transform;
\( LIQBD \) : Level Independent Quasi-Birth-Death;
\( LDQBD \) : Level Dependent Quasi-Birth-Death;