In-Depth Analysis of HARQ Performance in Active RIS-Assisted RSMA Systems

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Abstract: Utilizing reconfigurable intelligent surface (RIS) technology to construct intelligent radio environments is a prerequisite for developing the sixth-generation (6G) communication networks characterized by ultra-high speed, minimal latency, and extensive connectivity. Therefore, to further enhance the coverage and robustness of wireless communication systems, we investigate an active RIS-assisted rate-splitting multiple access (RSMA) system. Specifically, we examine the effect of relevant parameters on system performance by deriving the analytical expressions of the outage probability (OP) for users employing hybrid automatic repeat request (HARQ) transmission protocol. The numerical results indicate that: 1) Implementing the HARQ transmission protocol can boost signal quality and improve system reliability. 2) The increase in the number of reconfigurable elements also significantly enhances the stability performance of the considered system.

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