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Author(s) Name	M.T. Alam and Q. Ahsan		
Contact Email(s)	tawhidul.alam@aiub.edu		
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Abstract

Simultaneous AC-DC power transmission technique can improve both loadability and stability of a power system with long transmission line. But, there is a tradeoff between loadability and stability i.e. increase in the improvement of loadability causes the decrease in the improvement of stability and vice versa. Actually, it is a multi-objective optimization problem where the objective function depends on two decision variables with opposite in nature. Firstly, this paper presents an analytical expression for the objective function which is the function of two decision variables i.e. power flowing capacity and critical clearing time. Secondly, a mathematical model is developed for the optimal point of the objective function. Considering a typical system a numerical analysis is performed using the proposed expressions. Again, the impact of the line length and the voltage level of a transmission line on the objective function are also investigated. Finally, the developed model of the optimal point is applied to a real system to justify its ability to evaluate the combined benefit of loadability and stability of simultaneous AC-DC system.

