Table 5 shows the ISE and TVu indexes values for GPI and PID Controllers.

TABLE V
ISE COMPARISON

	ISE	TVu
PID	0.5757	$27.98\text{x}10^{-3}$
GPI	0.1387	$8.67\text{x}10^{-3}$

Fig. 10 shows the ISE comparison within PID and GPI Controllers.

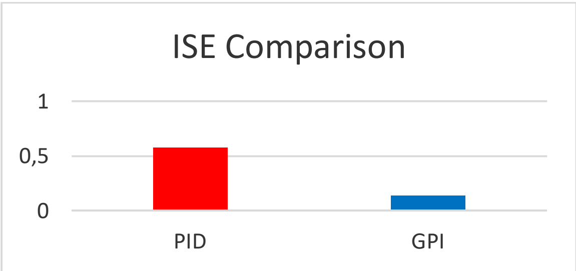

Fig. 10 ISE Index Comparison within PID and GPI Controllers.

Fig. 11 shows the TVu comparison between PID and GPI Controllers.

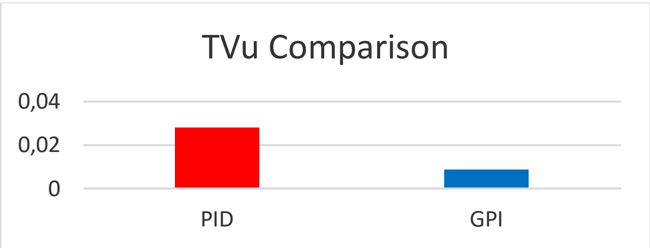

Fig. 11 TVu Index Comparison within PID and GPI Controllers.

The resulting graphs show that the best performance against disturbances is obtained for the GPI Controller since it presents better ISE and Tvu performances. Additionally, faster response and smoother control action compared to the PID control.

IV. CONCLUSION

This paper presents the design of a GPI controller from a FOPDT model of a process. The controller resulted in a faster response with a smoother control action than PID, as demonstrated by the ISE and TVu performance indexes values in each case. Robust GPI control is a good option for this type of process. However, if better results are required, it is necessary to re-tune using the parameter ϵ based on the ISE and TVu performance indexes.

Appropriate tuning of the controller makes the final element work better, reducing response times and prolonging its useful life. The controller approach benefits from being flexible and straightforward, as it has been established for any process that a FOPDT model can characterize. These characteristics make their industrial application extremely feasible. Therefore, the controller law should be relatively simple to execute in any DCS [6].

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