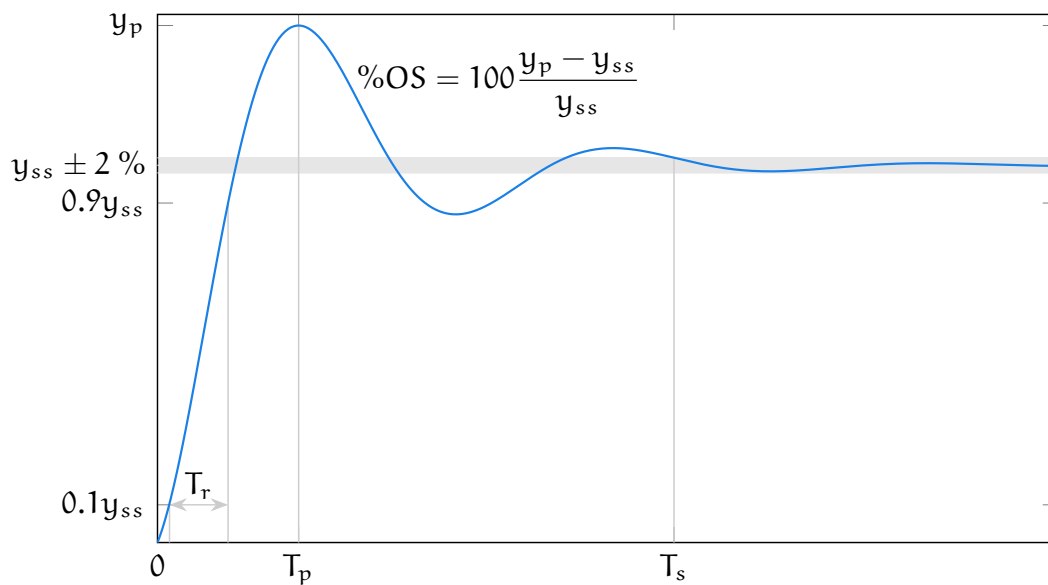


## 03.1 trans.char Transient response characteristics

We define four transient response characteristics, all defined in terms of a system's **step input response**. For the following, please refer to the illustration in **Fig. char.1**.

1. The **rise time**  $T_r$  is the duration from the time the response reaches 10 % to the time it reaches 90 % of its final value.
2. The **peak time**  $T_p$  is the time at which the response reaches its first or maximum peak.<sup>1</sup>
3. The **percent overshoot** %OS expresses the amount the response overshoots its steady-state value, expressed as a percentage of the steady-state value.
4. The **settling time**  $T_s$  is the time at which the response reaches, and thereafter remains within,  $\pm 2\%$  of its steady-state value.<sup>1</sup>

1. This definition assumes the step input occurs at  $t = 0$ . Otherwise, subtract the nonzero initial time.



**Figure char.1:** transient response characteristics rise time  $T_r$ , peak time  $T_p$ , percent overshoot %OS, and settling time  $T_s$  in terms of a response's steady-state  $y_{ss}$  and peak  $y_p$ .