The buffering parameters can be expressed trigonometrically, i.e., in terms of a “buffering angle” $\alpha$. This representation has the advantage that it allows one to represent any type of buffering behavior by a finite angle (between $-45^\circ$ and $135^\circ$), without any discontinuities. In contrast, infinite amplification (inverting or non-inverting) cannot be represented by a finite transfer coefficient $t$ or buffering coefficient $b$, perfect transfer cannot be represented by a finite transfer ratio $T$, and perfect buffering cannot be represented by a finite buffering ratio $B$. Moreover, the buffering angle has a intuitive meaning with respect to the representation of buffered systems by a space curve in $\mathbb{R}^3$ (see below).

The buffering angle can be introduced geometrically: A plot of buffering coefficient $b$ versus transfer coefficient $t$ in a system of rectangular coordinates yields a straight line (because, by definition, $t-b=0$). Each point on that line may be represented by positional vector $\vec{v} = \begin{pmatrix} t \\ b \end{pmatrix}$. The buffering angle $\alpha$ is the angle between the $t$-axis and the positional vector $\vec{v}$ (Figure 1).

Figure 1: Buffering Angle

See text of this Supplement for explanation.

The relation between $t$ and $\alpha$ is a bijection between $\mathbb{R}$ and the interval $]-45^\circ,135^\circ[$. Specifically, for any transfer coefficient $t$ ($t \in \mathbb{R}$), the unique
corresponding buffering angle $\alpha$ is defined by a mapping of $\mathbb{R}$ to the interval $]-45^\circ,135^\circ[$

$$
\alpha : t \rightarrow \arccos \left( \frac{t}{\sqrt{t^2 + b^2}} \right) \quad \text{for } t \leq 1, \text{ and }
$$

$$
\alpha : t \rightarrow -\arccos \left( \frac{t}{\sqrt{t^2 + b^2}} \right) \quad \text{for } t > 1.
$$

Reversely, for every angle $\alpha$ from the interval $]-45^\circ,135^\circ[$, the unique corresponding real number $t$ ($t \in \mathbb{R}$) is defined by the mapping of this interval to $\mathbb{R}$:

$$
t : \alpha \rightarrow \left( \frac{\cos \alpha}{\cos \alpha + \sin \alpha} \right).
$$

Similarly, a given buffering angle unambiguously defines the other buffering parameters:

$$
\begin{align*}
&b : \alpha \rightarrow \left( \frac{\sin \alpha}{\cos \alpha + \sin \alpha} \right) \\
&T : \alpha \rightarrow \left( \frac{\cos \alpha}{\sin \alpha} \right) \\
&B : \alpha \rightarrow \left( \frac{\sin \alpha}{\cos \alpha} \right)
\end{align*}
$$

A buffering angle $\alpha=0^\circ$ is equivalent to zero buffering, a buffering angle of $90^\circ$ to perfect buffering. Further equivalences between transfer coefficient $t$ and buffering angle $\alpha$ are listed in Table 2 of Buffering I – Supplement 7.

Interestingly, the buffering angle has a direct geometrical meaning with respect to the space curve that represents the buffered system in $\mathbb{R}^3$ (Figure 3 in the main text of Buffering I). The space curve can be projected parallel to the x-axis onto the yz-plane. Then, the buffering angle is the angle enclosed by the tangent to the projected space curve on the one hand, and the y-axis on the other.