

BIBO stability

A system is bounded-in bounded-out (BIBO) stable if a bounded input will result in a bounded output.

A system with unit sample response $h[n]$ will be BIBO stable if and only if $h[n]$ is absolutely summable. That is:

$$\sum_{n=-\infty}^{\infty} |h[n]| < \infty$$

A BIBO stable system is guaranteed to have a [Fourier transform](#), since:

$$|H(j\omega)| = \left| \int_{-\infty}^{\infty} h(t) e^{-j\omega t} dt \right| \leq \int_{-\infty}^{\infty} |h(t)| dt < \infty$$

We can use this property to conclude that the [region of convergence](#) of any BIBO stable system must include the Fourier transform. In the [z-domain](#), the Fourier transform corresponds to a unit circle in the complex z-plane, and in the [Laplace domain](#), the Fourier transform corresponds to the imaginary axis.

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