

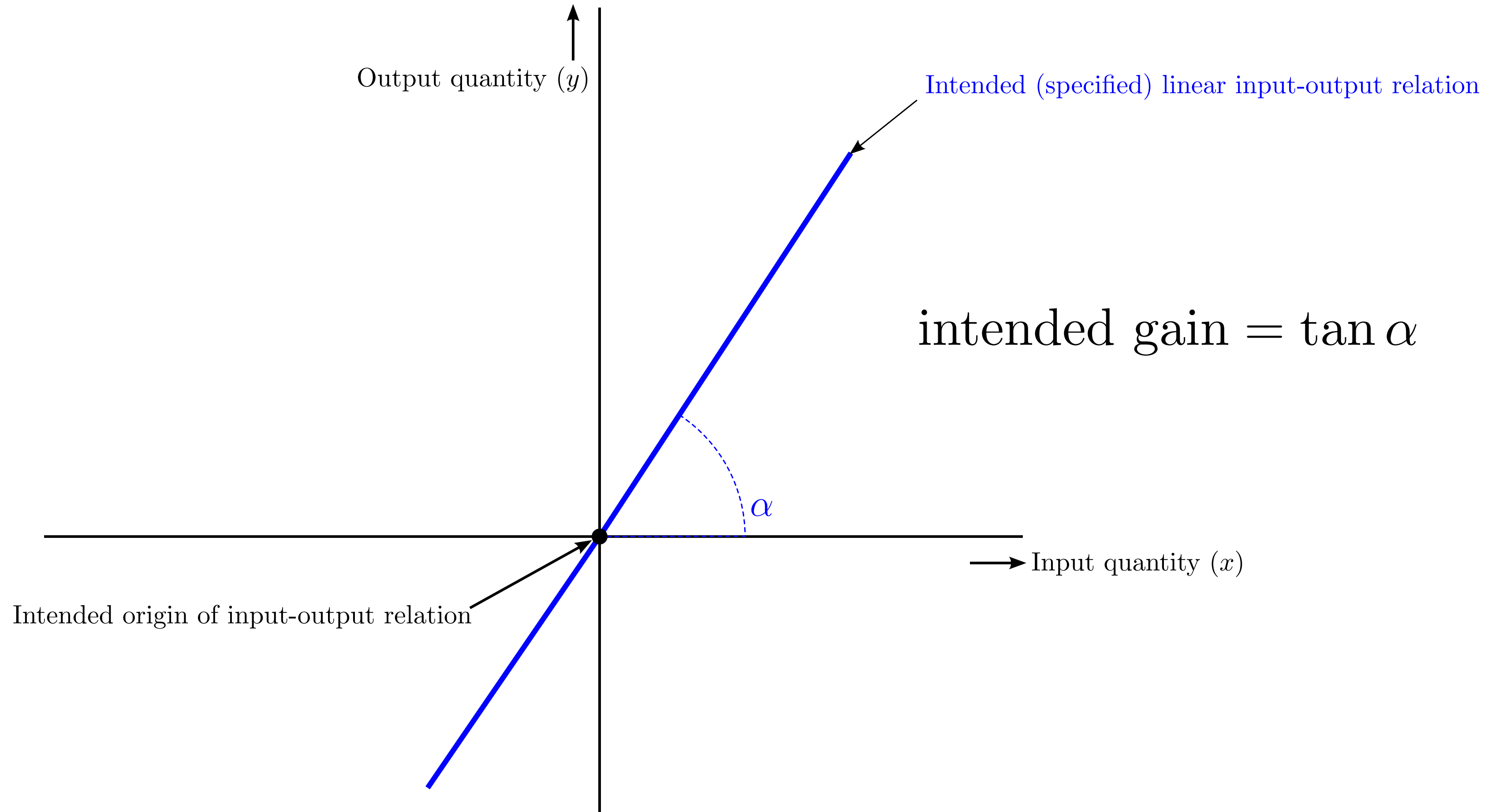
# **Structured Electronic Design**

EE3C11

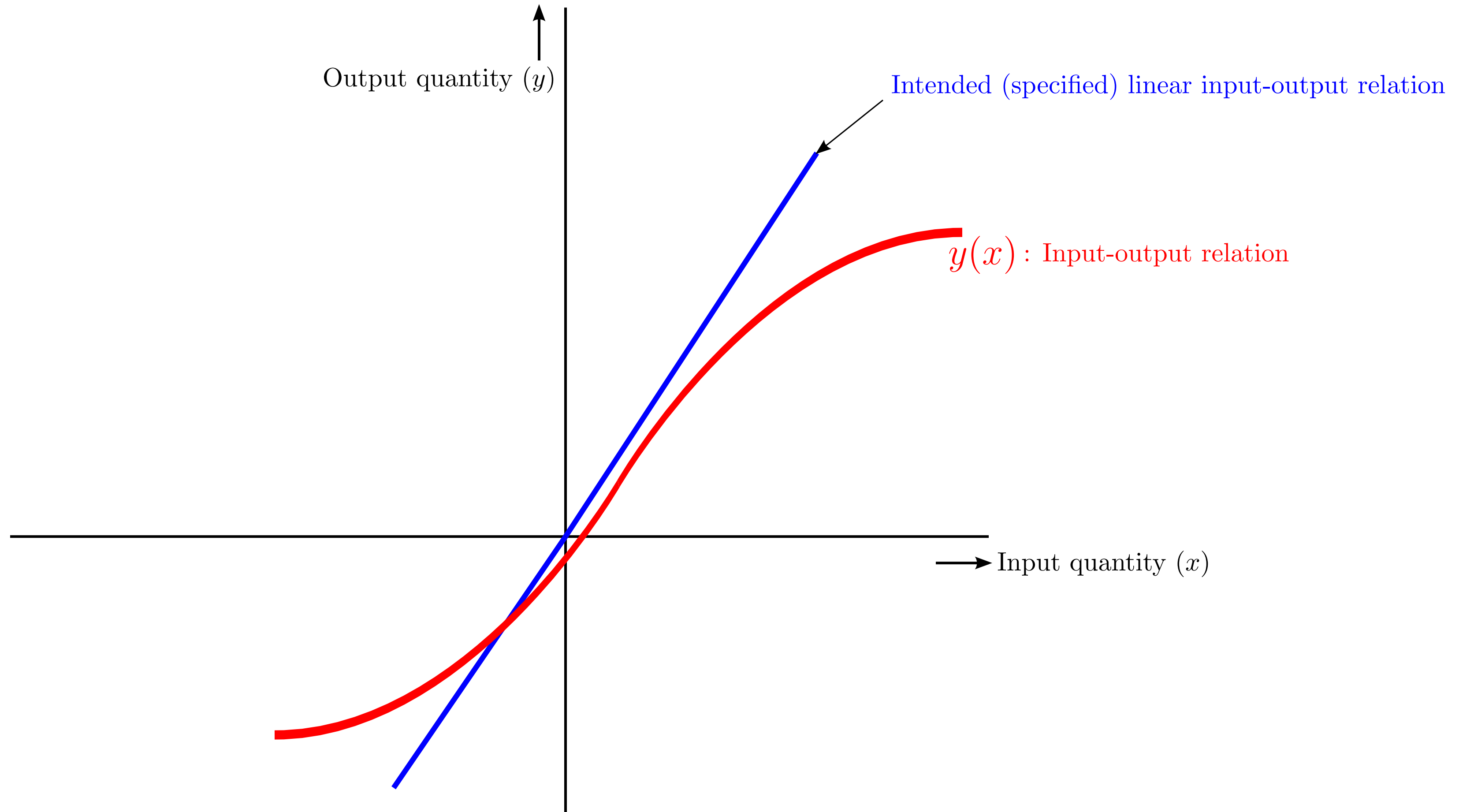
Amplifiers: weak nonlinearity

*Anton J.M. Montagne*

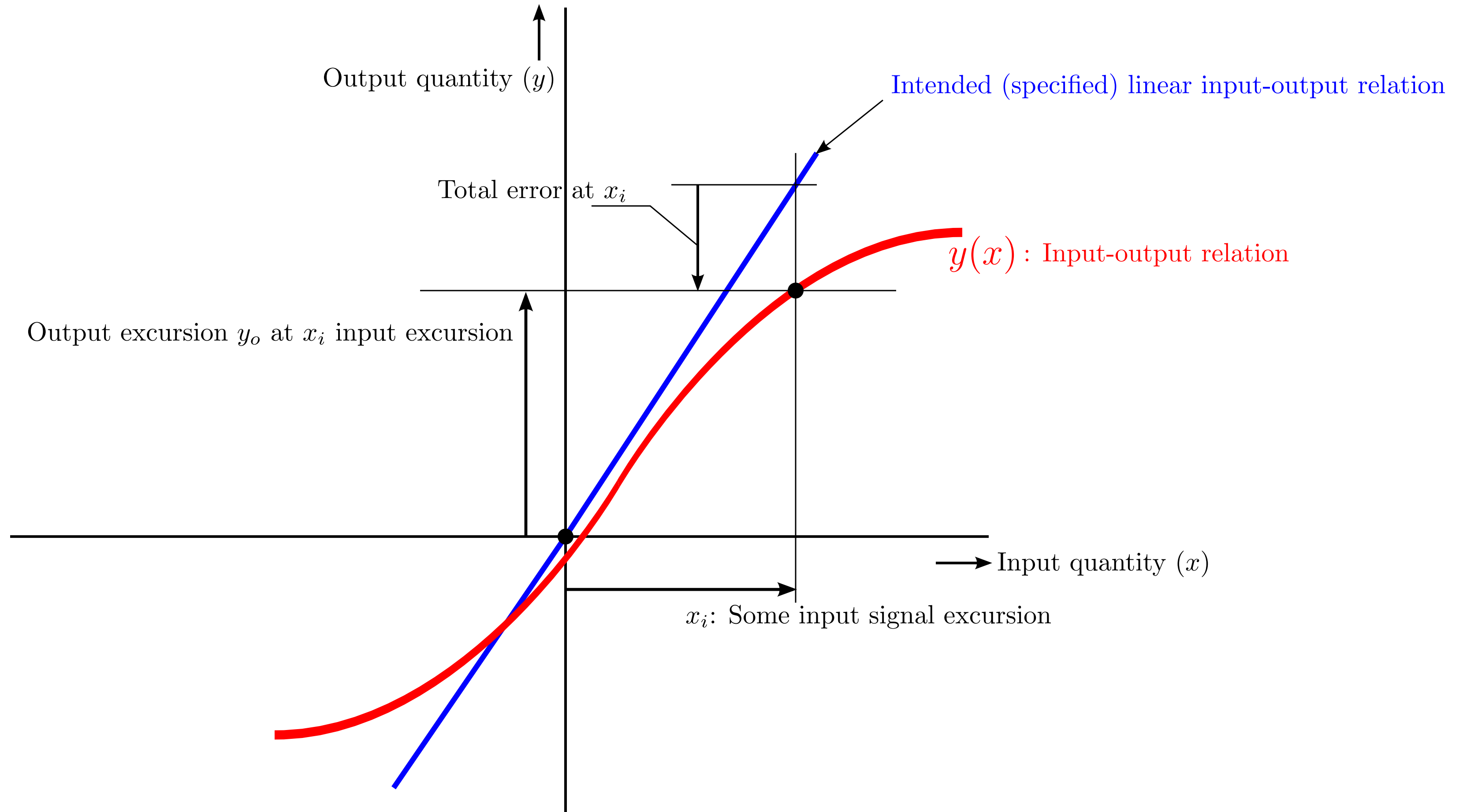
# Static (DC) input-output relation



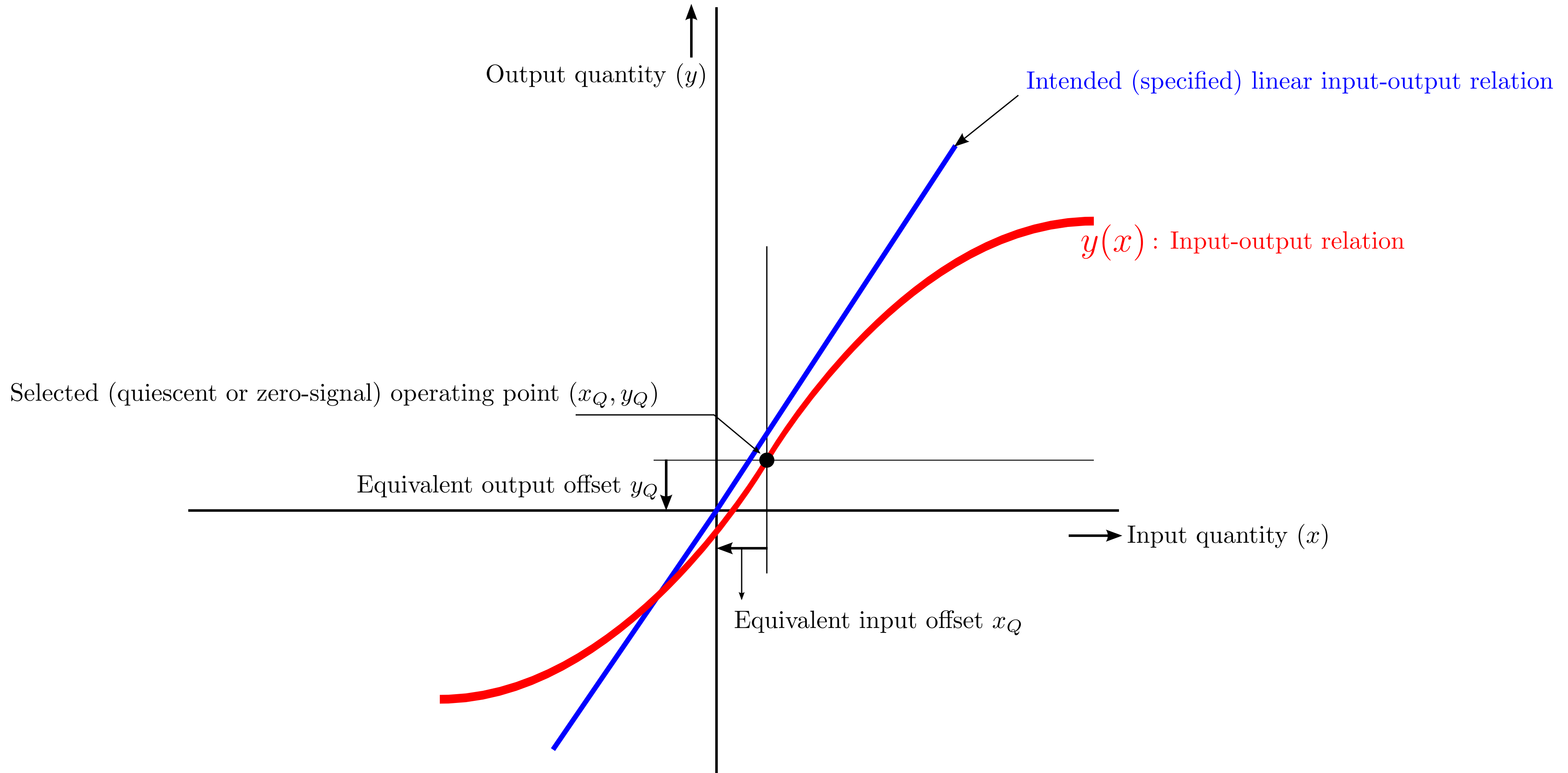
# Static (DC) input-output relation



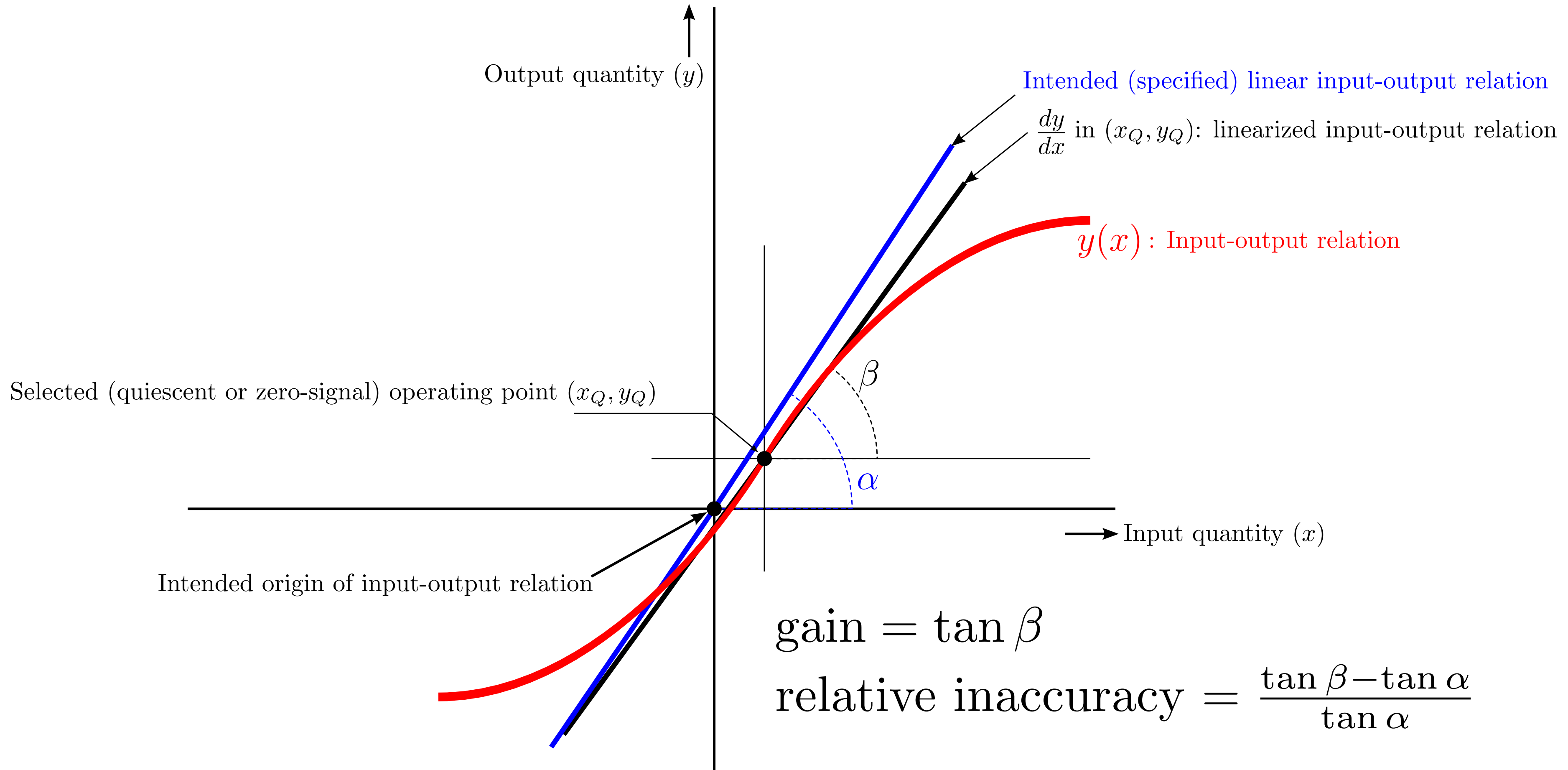
# Total error



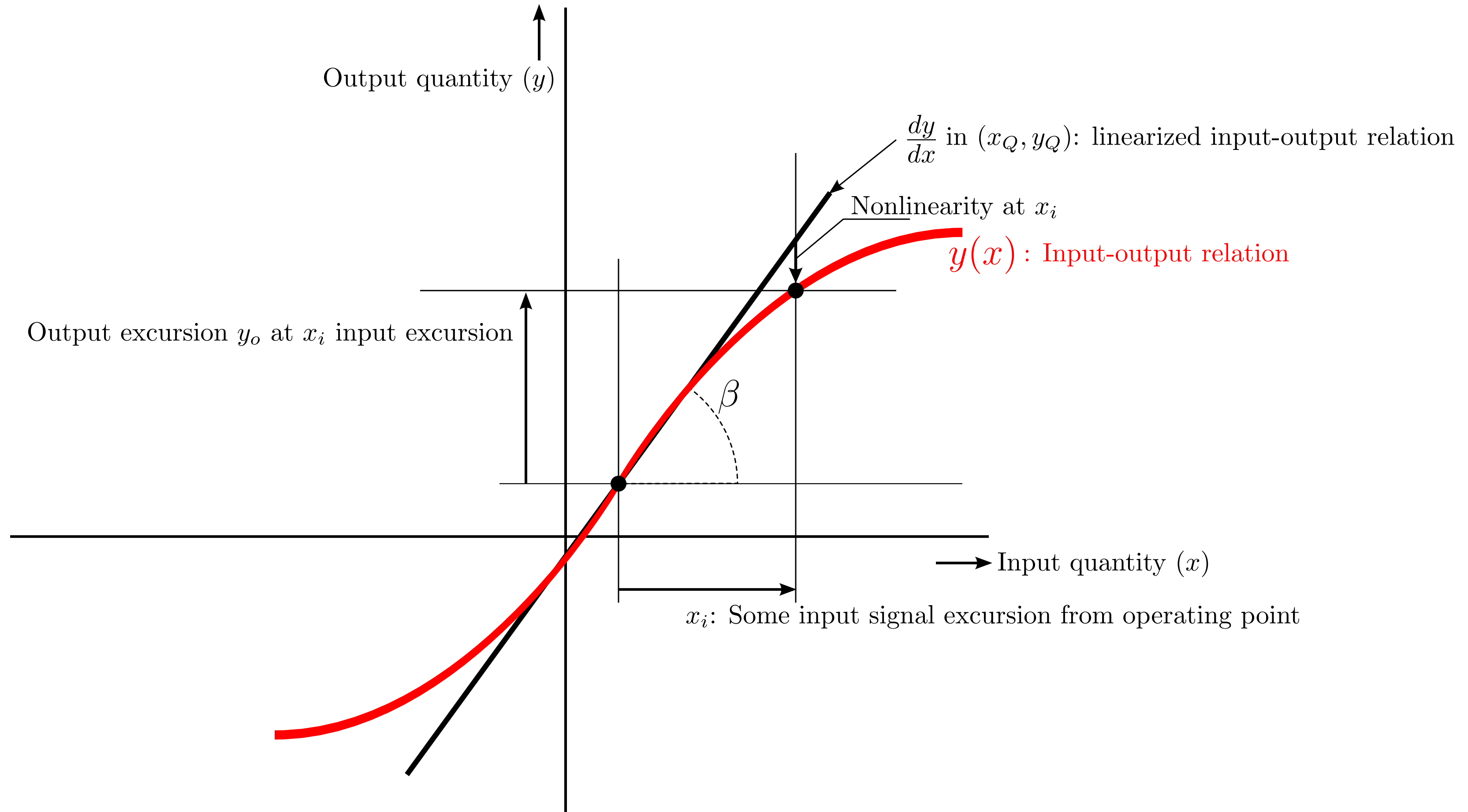
# Operating point and offset



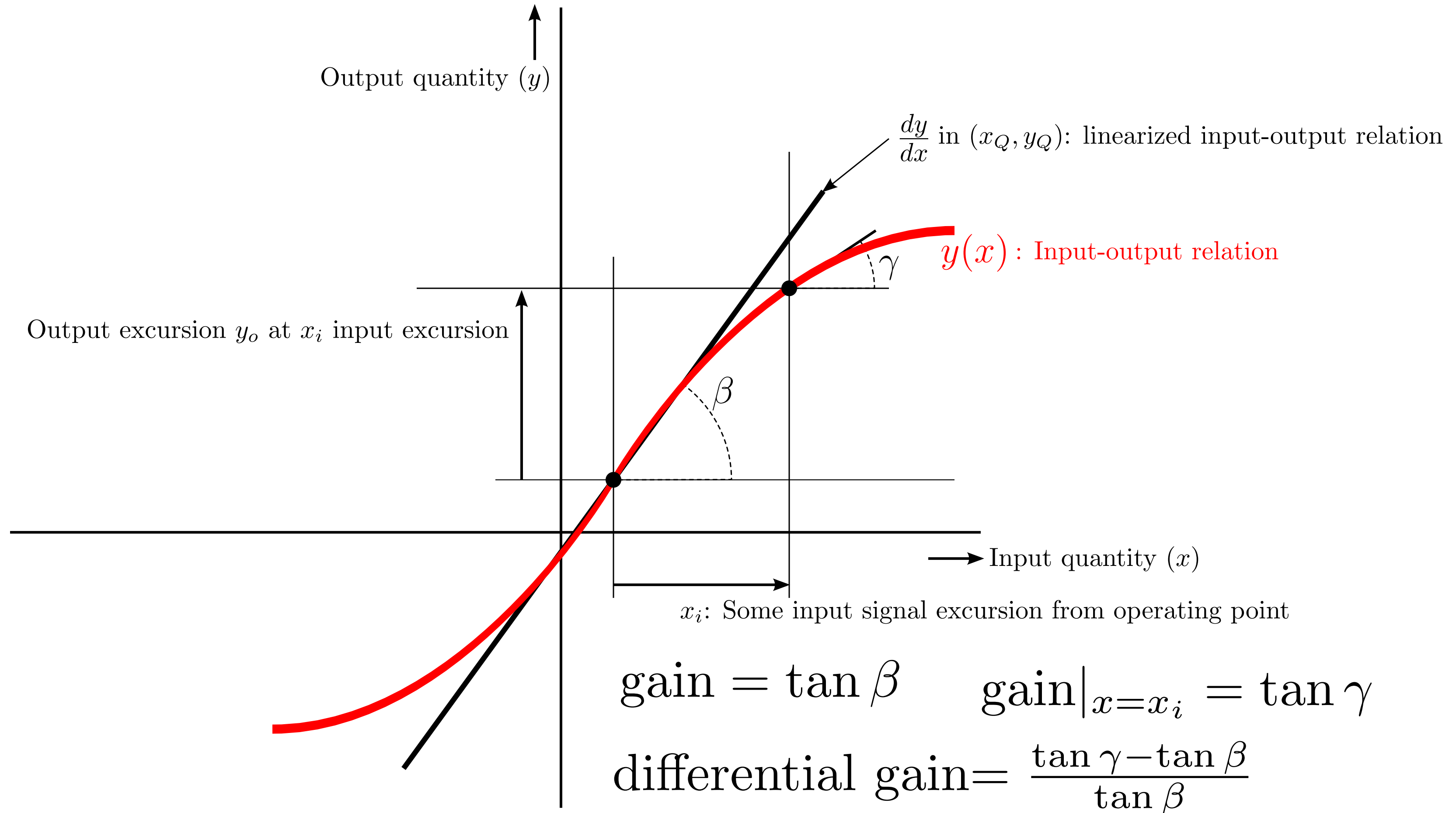
# Static (DC) input-output relation



# Nonlinearity



# Differential gain





# Distortion

Distortion: change of the shape of the signal; caused by:

(Linear) dynamic behavior (linear distortion)

Characterization as LTD system

Nonlinear behavior (introduces new frequency components)

Characterization depends on perception of errors

## **Radio systems**

Gain compression  
Intermodulation  
distortion

## **Audio systems**

Harmonic  
distortion

## **Control systems**

Differential gain  
Differential phase

## **Instrumentation**

Nonlinearity

Simple relations between description methods exist for weakly nonlinear, instantaneous systems

See sections: 2.4.7, 2.4.8, 17.5 and 17.6