

# Capítulo 2

## Mathematical Herramientas para Análisis de Sistemas de Control

Este capítulo presenta dos herramientas matemáticas **that** son especialmente útiles para analizar dinámica de procesos y diseño de sistemas de control automático: **Laplace** transforma y linealización. Combinadas, estas dos técnicas nos permiten comprender mejor las respuestas dinámicas de una amplia variedad de procesos e instrumentos. Por el contrario, la técnica de simulación por computadora nos brinda un análisis más preciso y detallado del comportamiento dinámico de sistemas específicos, pero rara vez nos permite generalizar nuestros hallazgos a otros procesos.

**Laplace** transformadas se utilizan para convertir las ecuaciones diferenciales que representan la comportamiento dinámico de las variables de salida del proceso en ecuaciones algebraicas. Es posible aislar ~~the~~ ecuaciones algebraicas resultantes lo que es característico del proceso, la *transfer function*, de lo que es característico de las funciones de forzamiento de entrada. Porque las ecuaciones diferenciales que representan la mayoría de los procesos son no lineales, se requiere linealización para aproximar las ecuaciones diferenciales no lineales con las lineales que luego pueden tratarse mediante el método de **Laplace** transforma

El material de este capítulo no es sólo una simple revisión de **Laplace** se transforma pero es una presentación de la herramienta en la forma en que se utiliza para analizar la dinámica de procesos y diseñar sistemas de control. También se presentan las respuestas de algunas funciones de transferencia de procesos comunes a algunas funciones de entrada comunes. Estas respuestas están relacionadas con los parámetros de las funciones de transferencia del proceso, de modo que las características importantes de las respuestas pueden inferirse directamente de las funciones de transferencia sin tener que invertirlas cada vez. Debido a ~~que~~ se requiere familiaridad con los números complejos para trabajar con

**Laplace** transformadas, hemos incluido una breve revisión del álgebra de números complejos como una sección separada. Creemos firmemente que un conocimiento de **Laplace** transforma es esencial para comprender los fundamentos de la dinámica de procesos y el diseño de sistemas de control.

### 2-1 EL LAPLACE TRANSFORMAR

En esta sección se revisa la definición de **Laplace** transformación y sus propiedades.

# Principles Of Numerical Control 2nd Edition

**Ian Pickup**



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