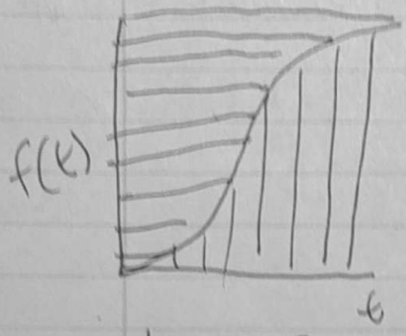
July 17th

Pg 1

CS 488 Animation

Velocity Curve



Key-Frame Systems

we generate a set of in-between frames from the specification of two or more frames.

Example: Simulating Accelerations: (Hearn & Baker 2nd Ed

a) constant speed (Zero acceleration)
- equal time intervals, for the in-betweens (IBs)

$\Delta t = \frac{t_2 - t_1}{n+1}$ n IBs for key frames at t_1 and t_2

$n+1$ intervals.

b) Positive Acceleration

- increase interval size $(1 - \cos\theta)$, $0 < \theta < \frac{\pi}{2}$

$$tIB_j = t_1 + \Delta t \left[1 - \cos\left(\frac{j\pi}{2(n+1)}\right) \right] \quad j = 1, 2, \ldots n$$

c) Negative Acceleration

- reduce interval size, $\sin\theta$, $0 < \theta < \frac{\pi}{2}$

$$tIB_j = t_1 + \Delta t \sin\left(\frac{j\pi}{2(n+1)}\right) \quad j = 1, 2 \ldots n$$

d) Combining Both Cases

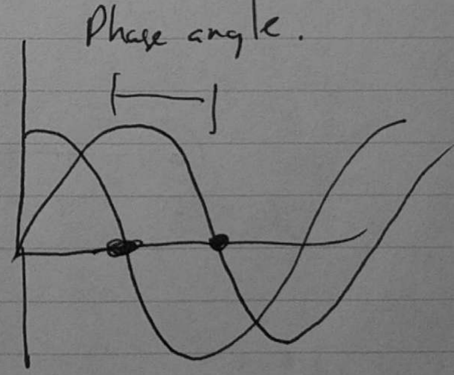
$$tIB_j = t_1 + \Delta t \left\{ \frac{1 - \cos[j\pi / 2(n+1)]}{2} \right\} \quad j = 1, 2, \ldots n$$

Direct Motion Specification

Ex. Bouncing ball:

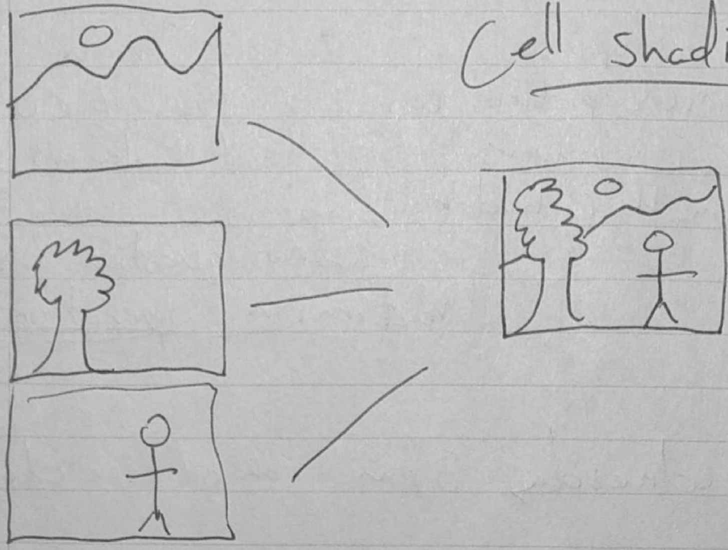
$$y(x) = A|\sin(\omega x + \theta_0)|e^{-kx}$$

A = initial amplitude
ω = angular frequency
θ_0 = phase angle
k = damping constant.



CS488 Animation

Cell shading

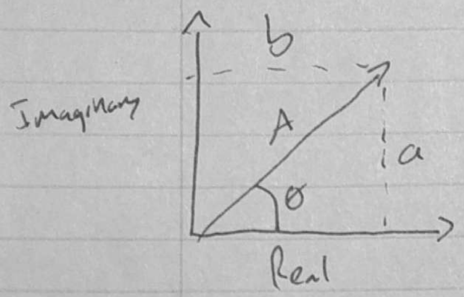


Classic Techniques

1. Squash and Stretch
2. Timing
3. Antecipation
4. Staging
5. Follow through and overlapping action
6. Straight Ahead and Pose to Pose Action
7. Slow in, Slow out
8. Arcs
9. Exaggeration
10. Secondary action
11. Appeal.

Allof these are used to convey personality.

Quaternions



- Iso tropic
- inverse problems easy
- ui is easier
- math is harder

- just know pros & cons of Euler vs Quaternions

★

- no question about Quaternion operations on Exam

Demo sign up
- Tuesday morning – wednesday 8pm on office door

Thursday ~~Tuesday~~ Morning 9-12 15 min slots
- Thursday Afternoon 2:30 - 5:30

Scanned by CamScanner

July 19th
Pg1

CS488 Animation

Goal Directed Systems

Kinematics and Dynamics

Forward kinematics (eg. Human motion)

- specify the animation by given motion parameters (eg, posititition, velocity, acceleration)

Inverse kinematics

Dynamics: Forces (physically - based modeling)
Examples: electromagnetic, gravitational, friction, Newtons laws, Motion for gravitational or friction processes. Maxwells law for electromagnetic forces Euler or Navier Stokes for fluids

→ Application of Numerical Methods → Initial Values
→ Boundary Conditions.