

Physics Animation in Uncharted 4: A Thief's End

基本物理模拟元素

Rigid Bodies

- Associated joint(s)
- Mass
- Friction
- Restitution(Bounciness)
- Inertial Tensor (根据给定的某个轴旋转的惯性, 越高越稳定)
- Linear Damping
- Angular Damping

Constraints

- Hinge
限制关节只在一个轴上旋转, 膝盖或者手肘
- Ragdoll
- Limits
- Max Friction Torque
 - 质量的20%
 - 模拟关节和肌腱的摩擦力

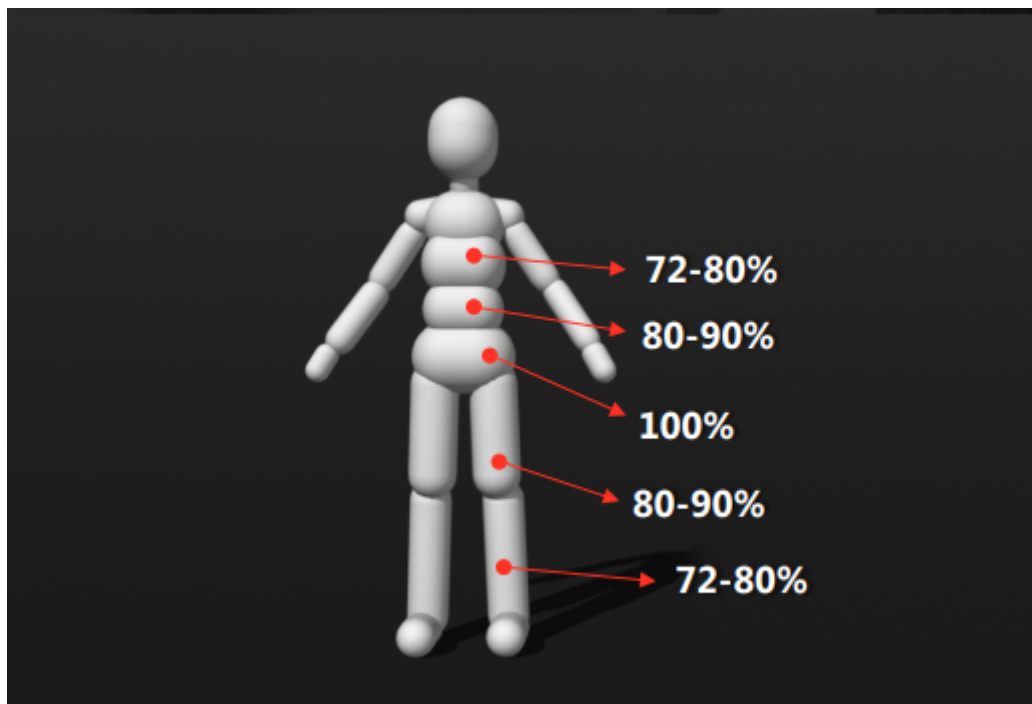
Constraints Motor

会让普通Constraints 变为power Constraints, 用来动画控制刚体。

- Maximum motor force
让刚体 (骨骼) 保持动画姿势的最大力
- Motor damping
用来约束 motor force
- Max Proportional Velocity
- Max Constance Velocity
还原动画姿势的速度
- Motor Tau
motor stiness(弹性)

设置Ragdoll

- RB Weight Ratios
从Root骨骼开始, 刚体的质量应该以10%的速度递减



- Inner Collisions
去除不需要的碰撞

BASICS RIGID BODY STATES

骨骼的状态 (刚体的状态)

KeyFramed

适用：手、脚

- Purely driven by animation
- Does not alter its path when colliding with other objects
- We use them for pinning characters to other objects •
- Collisions usually disabled

Powered/Animated

- RB is driven by animation
- Animation can be altered by applying impulses or by colliding with other objects.

Unpowered/Simulated

- RB is not driven by animation / is not powered
- Only gravity and constraints are influencing the RBs

两种Controller

Rigid Body Controller (Keyframe Controller)

尝试设置RagDoll上刚体的速度和角速度来驱动刚体摆出正确的姿势

- Recommended for live characters
- Works in world space (bone transforms)
- Easy to match an animation pose
- Very stable
- Results not as realistic as motors

Powered Constraint Controller

使用附加在刚体上的powered constraints的力来驱动刚体摆出正确的姿势

- Recommended for dead or dying characters
 - Works in local space (joints)
 - Somewhat hard to match the pose
 - Tend to overshoot the pose and vibrate
 - Realistic results, but noisier than Keyframe
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