



Physics for Game Developers

David M Bourg

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Colliding billiard balls. Missile trajectories. Cornering dynamics in speeding cars. By applying the laws of physics, you can realistically model nearly everything in games that bounces around, flies, rolls, slides, or isn't sitting still, to create compelling, believable content for computer games, simulations, and animation. *Physics for Game Developers* serves as the starting point for those who want to enrich games with physics-based realism. Part one is a mechanics primer that reviews basic concepts and addresses aspects of rigid body dynamics, including kinematics, force, and kinetics. Part two applies these concepts to specific real-world problems, such as projectiles, boats, airplanes, and cars. Part three introduces real-time simulations and shows how they apply to computer games. Many specific game elements stand to benefit from the use of real physics, including:

- The trajectory of rockets and missiles, including the effects of fuel burn off
- The collision of objects such as billiard balls
- The stability of cars racing around tight curves
- The dynamics of boats and other waterborne vehicles
- The flight path of a baseball after being struck by a bat
- The flight characteristics of airplanes

You don't need to be a physics expert to learn from *Physics for Game Developers*, but the author does assume you know basic college-level classical physics. You should also be proficient in trigonometry, vector and matrix math (reference formulas and identities are included in the appendixes), and college-level calculus, including integration and differentiation of explicit functions. Although the thrust of the book involves physics principles and algorithms, it should be noted that the examples are written in standard C and use Windows API functions.



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