



Apr 17th, 9:00 AM - 10:00 AM

From Brownian Motion to Stocks and Futures: A Historical Look at the Development of Stochastic Calculus

Jerome C. Majewski
Illinois Wesleyan University

Narendra K. Jaggi, Faculty Advisor
Illinois Wesleyan University

Follow this and additional works at: <https://digitalcommons.iwu.edu/jwprc>

Majewski, Jerome C. and Jaggi, Faculty Advisor, Narendra K., "From Brownian Motion to Stocks and Futures: A Historical Look at the Development of Stochastic Calculus" (1999). *John Wesley Powell Student Research Conference*. 10.
<https://digitalcommons.iwu.edu/jwprc/1999/posters/10>

This Event is protected by copyright and/or related rights. It has been brought to you by Digital Commons @ IWU with permission from the rights-holder(s). You are free to use this material in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/ or on the work itself. This material has been accepted for inclusion by faculty at Illinois Wesleyan University. For more information, please contact digitalcommons@iwu.edu.

©Copyright is owned by the author of this document.

Poster Presentation 21

**FROM BROWNIAN MOTION TO STOCKS AND FUTURES: A
HISTORICAL LOOK AT THE DEVELOPMENT OF STOCHASTIC CALCULUS**

Jerome C. Majewski and Narendra K. Jaggi*

Department of Physics, Illinois Wesleyan University

Einstein had shown in 1905 that the random “Brownian movement” first witnessed by Robert Brown in 1828 could be explained by the kinetic molecular theory¹. Almost twenty years later, mathematician Norbert Wiener explained “the mathematical properties of the curve followed by a single particle” exhibiting Brownian motion by characterizing the dynamics as a mathematical stochastic process². His work in turn introduced a new area of probability theory now referred to as stochastic integration. In the following decades, most mathematical physicists seem to have become occupied with the exciting developments of quantum mechanics. However, the 1973 papers of Black, Scholes³, and Merton⁴ regarding the pricing of risky assets revived interest in stochastic integration, resulting in the pursuit of many applications for stochastic calculus. This poster will present the history, growth, and future of stochastic calculus and its apparent links with Physics and Economics.

¹Einstein, Albert. Investigations on the theory of Brownian movement. New York: Dover Publications, 1956. 86-7.

²Masani, Paul R. Norbert Wiener. Boston: Birkhäuser Verlag Basel, 1990. 83-6.

³Black, Fischer, and Myron Scholes, “The pricing of options and corporate liabilities.” Journal of Political Economy 81 (1973): 637-654.

⁴Merton, Robert. “Theory of rational option pricing.” Bell Journal of Economics and Management Science 4 (1973): 141-183.