

Feynman Perturbation Expansion for Pricing Swaptions

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European options on coupon bonds are studied in a field theory model of forward interest rates. A approximation scheme for finding the option price is developed based on the fact that the volatility of the forward interest rate is a small quantity. The field theory for the forward interest rates is Gaussian, but when the payoff function for the coupon bonds option is included it makes the field theory nonlinear. Feynman perturbation expansion, using Feynman diagrams, gives a convergent result for the price of coupon bond option. The correlation of two coupon bond options is approximately evaluated.

Interest rate swaptions are shown to be a special case of the coupon bond option, and some special features of swaptions are discussed.

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