

Abstract: The Diffie-Hellman (DH) problem is a problem that is assumed to be difficult to do, hence the security of many cryptographic protocols is reduced to this problem. We show a new variant of the DH problem — the twin DH problem. We propose a method which allows us to simulate a decision oracle without knowing the discrete logarithms of the elements. We show twin ElGamal encryption and its security in a random oracle model. ElGamal is secure against chosen ciphertext attack when we assume that the symmetric encryption is secure against chosen ciphertext attack and the DH problem is hard. We prove that the DH non-interactive key exchange protocol is secure against an active attack in a random oracle model when the DH problem holds.