ON CHEMICAL GRAPHS AND THEIR APPLICATIONS TO CODING THEORY

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ABSTRACT

In this paper, by exploiting matrix representation of chemical graphs, an encryption method is proposed for maintaining security of messages with three levels. The first level of this encryption method benefits from the adjacency and Laplacian matrices of chemical graphs. Then, the message is further encrypted using Jacobsthal numbers (taken in min matrix form) by subtracting from the corresponding elements of the product of the adjacency matrix of the chemical graph and message (taken as circulant matrix). Here the chemical graph can be taken as private key. The matrix so formed can be treated as an adjacency matrix which in turn can be represented as a graph and will be sent to the receiver as super encrypted message. The receiver writes the adjacency matrix corresponding to the graph, then adds the Jacobsthal matrix from adjacency matrix and then multiplies it with the inverse of the obtained matrix C using the shared private keys Finally, receiver decrypts the message using the private key shared.

Keywords Graph · Circulant matrix · Min matrix · Jacobsthal Numbers · Cryptography

References

[1] Fred Piper and Sean Murthy ”Cryptography: A very short introduction”, Oxford University Press (2002).

[2] J. Buchman “Introduction to Cryptography”, Springer-Verlag (2001).

[3] Neal Koblitz, “A Course in Number Theory and Cryptography”, Springer-Verlag (1987).

[4] K. H. Rosen, “Elementary Number Theory and Its Applications,” Third edition, Addson Wesly.

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