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A modular symmetric approach to neutrino mixing with Froggatt-Nielsen mechanism

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One of the unsolved problems of the Standard Model (SM) is the flavor structure of the fermions. The hierarchy in the mixing angles and masses, both in the quark and lepton sectors, can only be explained by theories beyond the SM. The Froggatt-Nielsen (FN) mechanism is one of the elegant frameworks to explain the flavor structure of quarks and neutrinos. In general, the Froggatt-Nielsen mechanism needs additional horizontal symmetry $U(1)_{FN}$ to generate a mass hierarchy in the quark and neutrino sector. This symmetry is spontaneously broken at a high energy scale. In this work, we have implemented the FN mechanism in the modular symmetric framework. We do not need an extra $U(1)_{FN}$ symmetry because of the use of modular symmetry. The modular weights play the role of $U(1)_{FN}$ charge. We have developed a neutrino mass model to study neutrino oscillation parameters and Lepton Flavor violation using this mechanism.

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