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Enhancing Geometric Phases Sensitivity in Atomic Coupled Ring Interferometers by Modulating Inter-Ring Distance.[1] JOHN TOLAND, ELENI ROMANO, CUNY: LaGuardia Community College, Long Island city, New York — Previous theoretical work in the study of transmission properties of cold atoms in coupled ring waveguide structures has indicated that the sensitivity to geometrical phase shifts be greatly enhanced by increasing the number of rings in the array or by changing the relative size of the rings in an array of the coupled waveguides. The coupled ring structures in these simulations assumed zero distance between rings. Our research addresses how increasing the inter-ring distance of the chain of N rings affects the rotational sensitivity of a ring array interferometer. We determine the sensitivity of a ring array gyroscope by calculating the slopes of the transmission function with respect to phase at the sharpest transmission resonance in the transmission function. The distance between rings is parameterized as the product of the wave number k and the distance between the rings d, while the size of the rings is parameterized by the product of k and the ring circumference L. The transmission is periodic with oscillatory regions and zero transmission gap regions. Our results show that modulating the inter-ring distance near $kd = 0.5\pi$ leads to sharp transmission resonances with slopes that are orders of magnitude greater than those in ring arrays with directly connected rings.

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