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Doppler radar observation of the structure characteristics of a concentric eyewall tropical cyclone in the Taiwan area

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The kinematic and precipitation structure of Typhoon Lekima (2001) observed by kenting radar during the landfall period is examined in this study. The asymmetric reflectivity structure evolution of the inner core (within 100 km from the center of the storm) and its relation with the changes of the concentric eyewalls are emphasized. Using Fourier analysis technique, the asymmetry of the reflectivity field in the inner core is analyzed. The results show that the asymmetry is dominated by wave number 1 in the azimuth direction. The waves propagated inward during the formation stage of the outer eyewall and then propagated outward with a slower speed during the decaying period of the inner eyewall. The propagation speeds of the waves are much slower than the typical values of the gravity waves. These waves resemble features very similar to that of vortex-Rossby waves investigated by many recent theoretical and numerical studies.