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The sensor virus is a serious threat, as an attacker can simply send a single packet to compromise the entire sensor network. Epidemics become drastic with link additions among sensors when the small world phenomena occur. Two immunization strategies, uniform immunization and temporary immunization, are conducted on small worlds of tree-based wireless sensor networks to combat the sensor viruses. With the former strategy, the infection extends exponentially, although the immunization effectively reduces the contagion speed. With the latter strategy, recurrent contagion oscillations occur in the small world when the spatial-temporal dynamics of the epidemic are considered. The oscillations come from the small-world structure and the temporary immunization. Mathematical analyses on the small world of the Cayley tree are presented to reveal the epidemic dynamics with the two immunization strategies.

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