Vertex Covers and Eternal Domination

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The eternal domination problem requires a graph be protected against an infinitely long sequence of attacks at vertices by guards located at vertices, with the requirement that the configuration of guards induce a dominating set at all times. An attack at a vertex with no guard is defended by sending a guard from a neighboring vertex to the attacked vertex. We allow all guards to move to neighboring vertices in response to an attack. The eternal domination number is compared with the vertex cover number of a graph. One of our main results is that the eternal domination number is less than the vertex cover number of any graph of minimum degree at least two having girth at seven or more than eight. We show the parameters can be equal when the girth of the graph is less than five and present a number of other results.