The novel methodology for imperfection sensitivity analysis, presented in Barbero et al. [1 E.J. Barbero, A. Madeo, G. Zagari, R. Zinno, and G. Zucco, Imperfection Sensitivity Analysis of Laminated Foled Plate, Thin-Wall. Struct., vol. 90, pp. 128–139, 2015.[Crossref], [Web of Science ®] [Google Scholar]], is here applied for the evaluation of limit load of composite cylindrical shells. Koiter's perturbation method is used to calculate the imperfection paths emanating from mode interaction bifurcations, and the Monte Carlo method is used to test a large number of modes and all possible interactions among them. The computational cost is low because of the efficiency of Koiter's method. The demands of Koiter's method for accurate evaluations of higher order derivatives of the potential energy are met by a mixed, corotational element.