The article presents an efficient solution method for structural topology optimization aimed at maximizing the fundamental frequency of vibration. Nowadays, this is still a challenging problem mainly because of the high computational cost required by spectral analyses. The proposed method relies on replacing the eigenvalue problem with a frequency response one, which can be tuned and efficiently solved by a multilevel procedure. Connections of the method with multigrid eigenvalue solvers are discussed in details. Several applications demonstrating more than 90% savings of the computational time are presented as well.