New transitions of MgSiO$_3$ post-perovskite under ultrahigh pressure$^1$ KOICHIRO UMEMOTO, Department of Geophysics and Geology, University of Minnesota and Ames Laboratory, Iowa State Univand, SHUNQING WU, Ames Lab, Iowa state University and Department of Physics, Xiamen University, MIN JI, CAI-ZHUANG WANG, KAI-MING HO, Ames Lab, Iowa state University, RENATA WENTCOVITCH, Department of Chem Eng Mat Sci, University of Minnesota — Understanding the behavior of MgSiO$_3$ post-perovskite (PPV) under extreme pressures is fundamental for modeling the interiors of super-Earth type exoplanets and the cores of solar giants. Previously, MgSiO$_3$ PPV was predicted to dissociate into MgO and MgSi$_2$O$_5$ and then into MgO and SiO$_2$ (Umemoto et al., Science 311, 983 (2006); Umemoto and Wentzcovitch, EPSL 311, 225 (2011)). Using the adaptive genetic algorithm, we predict new phase transitions in MgSiO$_3$. The phase diagram calculated using the quasi-harmonic approximation shows that some transitions can occur in some super-Earths type exoplanets.

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