The Dispersion Calculator - a free software for calculating dispersion curves of guided waves

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The nondestructive inspection of components by means of guided waves is an emerging technology in fields like aerospace or pipeline construction. The guided waves' capability of propagating many meters in a structure is utilized for swift inspection tasks as well as structural health monitoring by means of acoustical emission. The German Aerospace Center uses Lamb waves excited by air-coupled ultrasound for the in-line quality assurance of large-scale aerospace vehicle components made from carbon composites. However, the use of guided waves in NDT requires knowledge of the dispersion curves. DISPERSE is the most renown software for the calculation of dispersion curves. Now, it is presented the free Dispersion Calculator. The MATLAB®-based Dispersion Calculator is an interactive and fully validated stand-alone software for the computation of dispersion curves and mode shapes of guided waves in isotropic and multilayered anisotropic composite plates. It features the particularly challenging capability of calculating laminates consisting of several hundreds of layers so that even the largest specimens, which we encounter at the German Aerospace Center, for example in the rocket booster manufacturing, can be calculated. This is made possible by the implementation of the stiffness matrix method. The Dispersion Calculator is also able to distinguish the different mode families, like symmetric and antisymmetric Lamb and shear horizontal waves, depending on the symmetry and coupling properties of a given layup. Lastly, it features highly efficient and robust dispersion curve tracing algorithms. The Dispersion Calculator can be downloaded free of charge at the German Aerospace Center homepage and it has already gained many users in the scientific community since its initial release in November 2018.