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Comparison of a new analytical solution with a numerical solution calculating a flexure of a thin plate: Which compensational interface (CMI or LAB) is obtained and what does the elastic thickness mean?

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We investigated the significance of input parameters for the calculation of the effective elastic thickness of the lithosphere, using a new analytical solution for the computation of the flexural rigidity. The calculations show that it is sufficient to operate with a constant value for the gravity as well as the Poisson's ratio. However, this is not valid for the Young's modulus, a key parameter controlling flexural deformation. Finite Element modelling (FEM) allows a calculation of a flexured multi-layer plate and provides a powerful tool for in-depth investigations. Previously, the elastic thickness and flexural rigidity of the lithosphere were calculated using a constant Young modulus. In consideration of a vertical variation of crustal composition, which corresponds to a change of Young modulus by orders of magnitude - the use of a constant standard value in the calculation process is doubtful. Subsequently, the analytical solution was compared with the numerical solution derived by FEM, which leads to a new interpretation and meaning of the compensation surface. It was found that the computations using the differential equation and the analytical solution are valid for the crust/mantle interface (CMI) as well as the lithosphere/ asthenosphere boundary (LAB). Thereby, it is important at which boundary the change of Young modulus takes place. Therefore, a new definition of the elastic thickness can be obtained: the value of the calculated elastic thickness is equivalent to the value of thickness of a corresponding plate described by a constant Young's modulus. Additional it was discovered that a temperature moment has to be taken into account for the consideration of flexu-

ral investigations. Summarizing, the variation of the effective elastic thickness can be explained by temperature distribution and a change of the Young’s modulus.