3. Discussion of the results

Numerical simulations have been performed for the confining pressure 100 kPa, the contact stiffness in the normal direction k_n from the interval 9 kN/m – 1.3 MN/m and the k_t/k_n ratio from the interval (0.1 – 1.0). The results are presented in Figs. 1 and 2 in the form of the curves showing the relationships between the dimensionless parameters: $Er/2k_n$, v and k_t/k_n for different values of k_n. The dependence of the Poisson's ratio on the k_t/k_n ratio for different values of k_n is plotted in Fig. 2. Numerical results in Figs. 1 and 2 are compared with the analytical estimations according to the Voigt and best fit hypotheses. Quite a good agreement can be observed especially for lower values of k_n and k_t/k_n. The dependence of the Young's modulus E on the microscopic stiffness k_n is shown in Fig. 3 in comparison with the results obtained by other authors.

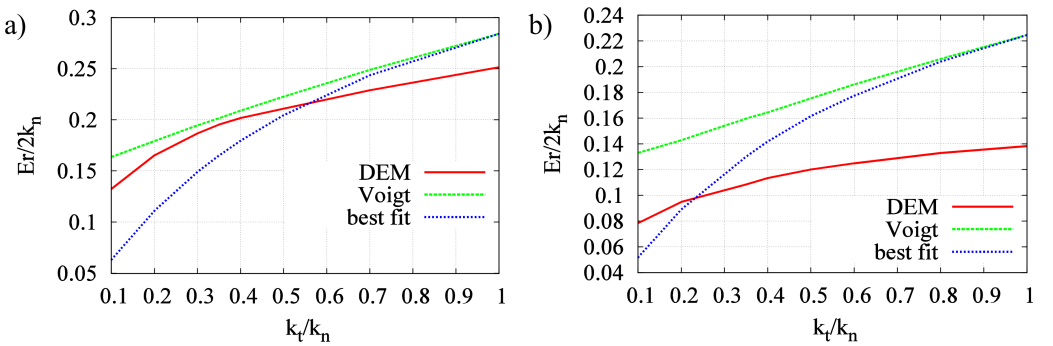

Fig. 1. Dimensionless micro-macro relationship for the Young's modulus for different values of k_n: a) 9 kN/m, b) 34 kN/m.

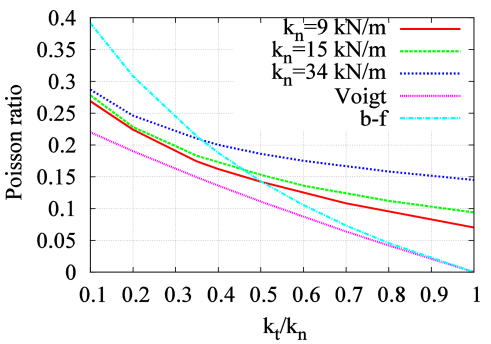

Fig. 2. Micro-macro relationships for the Poisson's ratio.

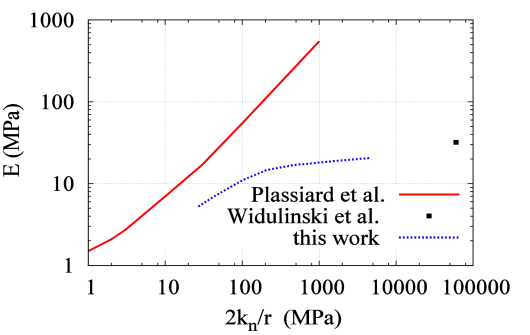

Fig. 3. Comparison of the numerical relationships from different works.

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