

***MultiSmart3D* – The Next Generation Algorithm for Pavement Design**

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In this talk, we introduce our unique algorithm – *MultiSmart3D* – for the pavement design. This program is developed based on our years' experiences on the modeling and simulation for multilayered materials and structures. It consists of the following features which cannot be found in any existing layered pavement design code:

- 1). We introduced the propagator matrix method so that one needs only to solve two 2×2 systems of linearly algebraic equations in the transformed domain, no matter how many layers one has in the pavement structure. Current codes in the pavement market can only handle at most 19 sublayers in total.
- 2). We also introduced the cylindrical system of vector functions so that the axisymmetric deformation can be exactly separated from the other part of the deformation.
- 3). We further utilized an adaptive Gauss quadrature along with an acceleration approach for fast and accurate calculation of the integration.
- 4). The observation point in our program can be at any location, far or near; immediately below or above any interface.
- 5). We can also handle arbitrary interfaces with different normal and shear spring constants, and treat arbitrary surface loading/geometry with super-fast calculation.

We will apply our algorithm to several practical pavement examples which will show that in these cases (where the resilient modulus has continuous and steep variation with depth), the pavement responses (in terms of strain and stress fields) based on the current 19 sublayer model can be wrong! We will also show some examples where the pavement response due to an actual surface load (non-uniform pressure on an irregular surface region), from the interaction between the tire and pavement, will be studied.

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