INITIAL AND BOUNDARY VALUES PROBLEMS FOR SEMI-INFINITE CUSPIDAL BARS

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By B.-W. Schulze and his followers the Mellin pseudo-differential operator theory has been created. This theory is suitable to investigate partial differential Equations on manifolds with singularities [1]. In particular, the application of this theory to the investigation of initial boundary value problems for elastic bodies with non-smooth boundaries on the base of three-, two- and one-dimensional mathematical models has a good chance of success. In order to illustrate this in the present paper using the Mellin transform in (0,0) approximation of a theory of cuspidal bars [2] the boundary value and initial boundary value problems have been solved in an explicit form if the area of the cross-section is the following function

$$h_0 x^{\alpha}, \;\; h_0, \; \alpha = const > 0, \;\; x \geq 0.$$

In statical case the result coincides with known resalts [2] obtained by direct integration. In dynamical case it is not possible to apply the latter approach. But using the Mellin transform, in case of special density, we menage to solve initial boundary value problem under usual initial conditions and admissible Dirichlet data indicated in [2].

References

[1] Schulze B.-W., Pseodo-Differential Operators on Manifolds with Singularities, North-Holland, Amsteram, 1991.

[2] Jaiani G.V., On a Model of a Bar with Variable Thickness, BULLETIN of TICMI, 2, 1998, 36-40. (electronic version: http://www.viam.hepi. edu.ge/others/TICMI).