

# Coverings and nonlocal symmetries of Lax-integrable PDEs

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**Abstract.** We consider four three-dimensional Lax-integrable equations: (1) the universal hierarchy equation  $u_{yy} = u_t u_{xy} - u_y u_{tx}$ , (2) the Pavlov equation  $u_{yy} = u_{tx} + u_y u_{xx} - u_x u_{xy}$ , (3) the rdDym equation  $u_{ty} = u_x u_{xy} - u_y u_{xx}$ , and (4) the modified Veronese web equation  $u_{ty} = u_t u_{xy} - u_y u_{tx}$ .

For each equation, expanding the known Lax pairs in formal series in the spectral parameter, we construct two differential coverings and completely describe the nonlocal symmetry algebras associated with these coverings. For all four pairs of coverings, the obtained Lie algebras of symmetries manifest similar (but not identical) structures; they are (semi)direct sums of the Witt algebra, the algebra of vector fields on the line, and loop algebras, all of which contain a component of finite grading.

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