Stochastic Modeling of Inclined Heterolithic Stratification With the Bank Retreat Model

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Inclined heterolithic stratification (IHS) sets are commonly encountered in the host rock of the Alberta oil sands. Several important trends in petrophysical properties have been identified with respect to these sets. These features may have a significant impact on the response to exploitation through steam assisted gravity drainage (SAGD).

The IHS beds are derived from lateral accretion architectural elements within a fluvial depositional setting. The bank retreat fluvial model is a simplified process based model of stream meander migration. This model is parameterized by hydraulic parameters and initialized with realistic channel stream lines from the dampened harmonic model. A realistic channel profile with correctly positioned thalweg may be fit to the migrating streamlines. The migration of this channel results in the generation of realistic lateral accretion geometries.

Multiple realizations of the IHS sets may be calculated with the bank retreat model. The significant petrophysical property trends may be fit to these IHS sets. The resulting trend models may be applied to geostatistical simulation for the construction of more realistic petrophysical realizations.