# **A Continuous Form of the Perez Diffuse Sky Model** for Forward and Reverse Transposition

using POA measurements in solar resource characterization

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#### Forward transposition

The Perez model works very well for calculating POA irradiance because it is based on a very large set of observations, and the essence of those observations is captured in a table of empirical factors. We have transformed this table into six spline curves, so there are no longer jumps or discontinuities in calculated POA irradiance as sky conditions evolve.

The Perez-Driesse model is a plug-in replacement for the original model.



## Performance assessment using POA measurements

Using the new algorithms it is possible to produce a MET file based on POA measurements such that in subsequent system simulations using the Perez model (with PVsyst or other software) the calculated POA irradiance matches the measurements. This can be very useful for capacity testing, for example.



#### **Reverse transposition**

Calculating GHI from POA requires an iterative search. An initial estimate of GHI is adjusted incrementally so that when it is transposed, the calculated POA matches the measured POA. Jumps or discontinuities in the calculated POA can lead such a search to fail, or produce the wrong GHI. The new continuous form thus makes reverse transposition searches both easier and more reliable.

Generic bisection search outperforms the more complex GTI-DIRINT algorithm.



These two figures show the errors in calculated GHI (left) and calculated POA (right) obtained with reverse transposition using a generic bisection search and Perez-Driesse transposition.

## Site Adaptation using POA measurements

Ground measurements are often used to quantify site-specific bias of satellitebased irradiance observations. GHI is the main quantity that is measured and modeled for this purpose. Reliable conversion of POA to GHI makes it possible to use POA measurements for this process instead.





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Scan here to see a more detailed presentation on the Perez-Driesse model.

An open-source version will be available in pylib-python soon!

