

obtaining modeled data for the selected parameter set through use of ~~a~~ the
simulation model based on the first and second sets of historical
production data; and

identifying the selected parameter set values by determining a minimum fitting
error between the modeled data for the selected parameter set and the
first and second sets of historical production data.

4. The method of claim 1, wherein determining the validation error for each
parameter set of the array comprises:

separating a modeling timeframe into a first sub-timeframe and a second sub-
timeframe;

determining forecast of second sub-timeframe production data based on the
simulation model with geological parameter values equal to the estimates
determined according to the fitting model of the first sub-timeframe; and

comparing the second sub-timeframe forecasted production data to production
data measured during the second sub-timeframe.

5. The method of claim 4, wherein comparing the second sub-timeframe
forecasted production data to production data measured during the second sub-
timeframe comprises computing a squared error between the second sub-
timeframe forecasted production data to the production data measured during the
second sub-timeframe.

6. The method of claim 1, wherein determining the validation error for
each parameter set of the array comprises performing cross-validation.

7. The method of claim 1, wherein identifying the optimal parameter set
size further comprises minimizing the fitting error for each parameter set of the
array.

8. The method of claim 1, wherein identifying the optimal parameter set
size further comprises minimizing the combined error for each parameter set of
the array.

obtaining modeled data for the selected parameter set through use of ~~a~~the
simulation model based on the first and second sets of historical
production data; and

5 identifying the selected parameter set values by determining a minimum fitting
error between the modeled data for the selected parameter set and the
first and second sets of historical production data.

12. The apparatus of claim 11, wherein the operation of determining the
validation error for each parameter set of the array comprises:

10 separating a modeling timeframe into a first sub-timeframe and a second sub-
timeframe;

determining forecast of second sub-timeframe production data based on the
simulation model with geological parameter values equal to the estimates
determined according to the fitting model of the first sub-timeframe; and

15 comparing the second sub-timeframe forecasted production data to production
data measured during the second sub-timeframe.

13. The apparatus of claim 12, wherein comparing the second sub-
timeframe forecasted production data to production data measured during the
20 second sub-timeframe comprises computing a squared error between the second
sub-timeframe forecasted production data to the production data measured
during the second sub-timeframe.

14. The apparatus of claim 9, wherein the operation of determining the
25 validation error for each parameter set of the array comprises performing cross-
validation.

15. The apparatus of claim 9, wherein the operation of identifying the
optimal parameter set size further comprises minimizing the fitting error for each
30 parameter set of the array.

19. The non-transitory computer-readable medium of claim 18, wherein the operations further comprise:

obtaining modeled data for the selected parameter set through use of a ~~the~~ simulation model based on the first and second sets of historical production data; and

identifying the selected parameter set values by determining a minimum fitting error between the modeled data for the selected parameter set and the first and second sets of historical production data.

20. The non-transitory computer-readable medium of claim 19, wherein the operation of determining the validation error for each parameter set of the array comprises:

separating a modeling timeframe into a first sub-timeframe and a second sub-timeframe;

determining forecast of second sub-timeframe production data based on the simulation model with geological parameter values equal to the estimates determined according to the fitting model of the first sub-timeframe; and comparing the second sub-timeframe forecasted production data to production data measured during the second sub-timeframe.

21. The non-transitory computer-readable medium of claim 20, wherein comparing the second sub-timeframe forecasted production data to production data measured during the second sub-timeframe comprises computing a squared error between the second sub-timeframe forecasted production data to the production data measured during the second sub-timeframe.

22. The non-transitory computer-readable medium of claim 17, wherein the operation of determining the validation error for each parameter set of the array comprises performing cross-validation.